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ABSTRACTS OF CURRENT LITERATURE

SURGERY OF THE HEAD AND NECK

HEAD

Yosset, G. J.: The Late Results of Surgical Treatment in Compound Fractures of the Vault of the Skull. *Vestnik khir.*, 1940, 59: 117

This article is based on observations of 109 patients with compound fractures of the vault of the skull. Twenty-two patients (20.1 per cent) died, while 87 patients (79.9 per cent) recovered. Forty of the latter (45 per cent) underwent periodic examinations extending over a period of from one to nine years.

It appears that the disability is produced chiefly by cerebral symptoms. Contrary to the statements of several writers, epilepsy is not a very frequent complication after skull fractures: of 40 patients, only 1 suffered from this condition. A series of relatively serious subjective complaints did not interfere with resumption of professional work. No close relationship could be established between the intensity of the trauma and the nervous symptoms reported.

It must be admitted that the method of examination of late results of skull fractures is far from satisfactory as it is chiefly based on subjective complaints. Several new methods of objective study have recently been developed, e.g., determination of the diastolic pressure of the retinal artery, encephalography, and Foerster's iodine test of the spinal fluid; but complicated technique and potential dangers, which are involved are responsible for the lack of popularity of the new examining methods.

In a large percentage of cases defects of the skull of various sizes remained after the operation; nevertheless, such defects were apparently not causing great disturbances as plastic operations were usually refused by the patients. Osteosclerotic changes could be detected roentgenographically in the regions of bone surrounding the defects.

Of 40 patients, including children and invalids, favorable conditions were found in 33, or 82 per cent. The statistics show that the results of surgical treatment in compound fractures of the vault of the skull are not as poor as is generally assumed.

JOSEPH K. NARAT, M.D.

Muench, J., and De l'Espine, A.: Contribution to the Statistics of Maxillary Fractures with Especial Consideration of Fractures of the Articular Process (Zur Kieferbruchstatistik unter besonderer Beruecksichtigung der Gelenkfortsatzfrakturen). *Deutsche Zahn- usw. Heilk.*, 1939, 6: 694.

This report concerns 154 individuals with fractures of the jaw, of whom 85 per cent were men (manual laborers) from twenty to thirty years of age. The injuries resulted chiefly from accidents in traffic and industry, only a few from athletics.

Eighty-five per cent of the fractures were compound; 74 per cent were confined to the lower jaw, 7 per cent to the upper jaw, and 19 per cent involved both the upper and lower jaws. In 34 per cent of the mandibular fractures the condyle was broken; in 38 per cent there was a bilateral fracture of the articular process; in 27 per cent of the latter there were fracture dislocations of the capitulum.

In spite of numerous, familiar, clinical signs, the diagnosis of fracture of the articular process is to be determined entirely by precise roentgenograms taken in at least two planes. The various types of fracture of the articular process and their mode of origin are discussed in detail. Three factors are responsible for a fracture dislocation of the head of the mandible: the strength of applied force, its direction, and the pull of the masticatory muscles. The head of the mandible may be dislocated in 4 directions: (1) downward and inward; (2) horizontally, rotated in a 90-degree arc; (3) toward or away from the pterygopalatine fossa; and (4) medially. In the treatment of such fracture dislocations, only the large fracture fragment receives attention and the dislocated head is left to shift for itself. The main fragment is immobilized by dental splints with intermaxillary elastic traction. In 23 per cent of the cases treated, the dislocated mandibular head healed firmly in anatomically correct position; in 17 per cent the position was approximately correct; in 52 per cent there was malunion, and in only 8 per cent did non-union result. In all cases the function of mastication was completely restored.

On the basis of the results described in 15 case histories at hand, conservative treatment is the

method of choice, in contrast to all operative procedures.

(V. BRANDIS). O. THEODORE ROBERG, JR., M.D.

Fontana, G. L.: Morphology of the Mixed Tumors of the Salivary Glands (Morfología de los llamados tumores mixtos de las glándulas salivales). *Rev. méd. d. Rosario*, 1940, 30: 437.

Fontana states that the varied histological structures found in tumors of the salivary glands, and especially of the parotid gland, have led to the belief that the tumors were due to elements belonging to different types of tissue or that they originated from distinct blastodermic layers, hence the term "mixed tumors." He reviews the history of these tumors and the theories that have been advanced for their explanation. He has made a personal study of 26 tumors of the salivary glands, all of which belong undoubtedly to the class of mixed tumors.

All authors agree that mixed tumors are by far the most frequent type encountered among tumors of the salivary glands. Mixed tumors are found preponderantly in the parotid gland (87 per cent in the present series) and are nearly always unilateral. They occur principally between the ages of twenty and fifty years (19 cases) and are about equally distributed between the two sexes. Chronic inflammation, stasis of the saliva, and trauma have been mentioned as predisposing factors by different authors. The tumors are of varying size (one of 26 lb. has been reported); they are generally single, but at times nodular or multiple. They are encapsulated and easily separated from the surrounding tissues, but they may be adherent to the glandular tissue when inflammation has supervened; adhesion to other tissues denotes malignant evolution with invasion through the capsule. They do not compress or invade the facial nerve as long as they remain benign, but they may compress the vessels; the occurrence of pain is therefore considered as a sign of malignancy. They are usually round or lobulated and their consistency varies according to their histological composition. Section reveals a smooth surface of grayish white color; myxomatous portions have a brilliant grayish color of vitreous aspect, cartilaginous portions are whiter, and cellular portions are pinker and more humid. The lobules are separated by white nacreous bands which also divide the tumoral tissue into various more or less irregular round zones.

Examination of the stained preparations shows that the histological forms fall into two great groups: those of epithelial aspect and those of connective-tissue aspect. Both are intimately related in the neoplasm. The author gives a detailed description of the two tissues; he studies individually the great variety of forms encountered in the tumors, demonstrates the intimate connections existing everywhere between the epithelium and the fundamental substance, and concludes that the fundamental tissues derive from the epithelial tissues and that consequently there is only one type of tissue, the epithelial, although it undergoes modifications. The only connective tissue present is that found in any tumor.

The author discusses Leroux's classification of mixed tumors and finds it unsatisfactory. He thinks that the tumors should be divided as follows:

1. Mixed tumors with little intercellular substance and with epithelial predominance, which possess great possibilities of evolution. These tumors are more inclined than others to react to any stimulus. The stimulus might be called an adjuvant factor which causes unfavorable evolution.

2. Mixed tumors with abundant fundamental substance and few epithelial elements. These are tumors which have already evoluted and offer less possibility of subsequent unfavorable evolution.

Although the term mixed tumors is inappropriate, the author proposes to keep it because common usage has already imposed it, but it should be used only with the understanding that these tumors are mixed only in their adult morphology and that their origin and evolution are absolutely epithelial.

RICHARD KEMEL, M.D.

EYE

Gifford, S. R., and MacPherson, W. A.: A Classification of Vascular Fundus Diseases. *Quart. Bull., Northwestern Univ. Med. School*, 1940, 14: 65.

The importance of routine ophthalmoscopic examinations in cardiovascular renal disease is being recognized more and more by clinicians. Unfortunately, there is not always perfect understanding between the internist and ophthalmologist as to the interpretation of ophthalmoscopic findings. Certain descriptive terms and short-cuts in expressions commonly used by ophthalmologists are not familiar to many internists, who are sometimes at a loss to evaluate the findings of a fundus examination. On the other hand, many ophthalmologists continue to employ the terminology of twenty years ago, which is difficult to reconcile with the recent advances in our knowledge of cardiovascular renal pathology.

The classification employed by the authors is as follows: "A," fundus picture; and "B," usual associated clinical picture.

Group 1. Retinal arteriosclerosis

A. Slight to moderate indentation of some veins by arteries
   Wide arterial reflex in some arteries
   Slight variation in the caliber of the arteries
   No hemorrhages or white deposits
   Ratio of arteries to veins about 2:3

B. Usually slight to moderate elevation of the systolic blood pressure; mean twenty-four hour diastolic pressure rarely above 110, often below 100. The picture is commonly that of benign essential hypertension, but patients are seen with little or no elevation of the blood pressure.
   Kidney function and blood chemistry usually normal

Patients usually over forty-five years of age
Prognosis relatively good

Group 2. Retinal arteriosclerosis with retinopathy
A. Somewhat more advanced vascular changes than in Group 1
Some indentation at most of the arteriovenous crossings. In addition, there are some patchy hemorrhages and white deposits, usually small and circumscribed.
Occasionally thrombosis of the veins or arteries
No diffuse contraction of the arteries
Ratio of arteries to veins about 2:3
B. In general, the same type of patient as in Group 1
Somewhat greater elevation of the blood pressure than in Group 1, but the diastolic pressure is seldom constantly high
Occasional slight changes in the kidney function and blood chemistry, but patients in fairly good health
Vascular accidents or coronary occlusion may occur at any time.
Barring such accidents, the prognosis for life is relatively good.

Group 3. Diffuse retinal arteriolar constriction
A. All arteries show definite contraction
Ratio of arteries to veins 1:2; often much less
There may or may not be some indentation of the veins
No hemorrhages or deposits
B. Earliest stage of diffuse angiospastic hypertension
Blood pressure, especially diastolic, usually quite high
Often no changes in the blood chemistry
Younger persons than those of Group 1 and 2
Typical cases seen in very early toxemia of pregnancy
Unless the condition is due to toxemia of pregnancy, in which prompt relief is obtained, patients are apt to go into Group 4 or 5 within a relatively short time.

Group 4. Diffuse retinal arteriolar constriction with retinopathy (hypertensive retinopathy)
A. Vascular contraction affecting all arteries more pronounced
Ratio of arteries to veins often 1:4 or less
Occasional occlusion of small arterioles
Hemorrhages and cotton wool deposits
Localized areas of retinal ischemia and edema
B. Well-developed essential hypertension
Diastolic pressure often constantly above 130
Changes in kidney function and in blood chemistry common
Found in severe or neglected toxemia of pregnancy
Prognosis—poor. Most patients are more or less incapacitated and die within four or five years. In toxemia of pregnancy this prognosis does not apply.

Group 5. Diffuse retinal arteriolar constriction with neuroretinopathy (hypertensive neuroretinopathy)
A. Same changes as in Group 4, also edema of the optic discs and surrounding retina. The elevation may be as marked as in choked disc, but changes in the arteries usually allow a distinction from the condition resulting from increased intracranial pressure.
Macular star frequent
Occasional detachment of the retina, especially in severe toxemia of pregnancy. The so-called albuminuric retinitis belongs to this group or to Group 4. Exceedingly high blood pressure and usually marked changes in kidney function and chemistry
Prognosis—very grave. Eighty per cent of the patients die within one year (Wagener). In toxemia of pregnancy this prognosis does not apply.

SUMMARY

1. A tentative classification of vascular fundus diseases is presented.

2. This will be subject to revision after a large series of cases has been followed up for a number of years, and when more accurate data as to the prognosis and associated clinical findings of cases placed in the various groups are available.

3. The classification attempts to separate cases with localized vascular changes associated with benign hypertension (Groups 1 and 2) from those showing diffuse angiospasm with or without retinopathy and neuroretinopathy (Groups 3, 4, and 5).

4. The difficulties and inaccuracies of this or any other system of classification are discussed and some possible practical advantages of the present one are suggested.

LESLIE L. MCCOY, M.D.

EAR

Kirkham, H. L. D.: The Use of Preserved Cartilage in Ear Reconstruction. *Ann. Surg.*, 1940, 111: 896.

The reconstruction of ears, either partial or total, has long been an unsatisfactory branch of plastic surgery because of the difficulty in securing a light, thin reproduction of the ear cartilage. The use of heterogenous ear cartilage depends on whether cartilage remains as such or is converted into fibrous tissue. Rib cartilage preserved in the abdominal wall during plastic procedures remains permanently as cartilage. Experimental transplantations of cartilage from the ear of a killed rabbit to the abdominal wall of another rabbit were carried out at hourly intervals up to seven hours after death. Cartilage preserved on ice, two pieces dry and two pieces in Ringer's solution, were transplanted at twenty-four hours and forty-eight hours. On removal and study six months later all were intact except the iced pieces which showed the morphology of cartilage but death of the cells. Cartilage removed from the human ear shortly after death and transplanted to the abdominal wall of another individual was palpable one

year later but was never removed for study. Cadaver cartilage or autogenous cartilage, if the amputated piece is available, can be preserved in aqueous methiolate solution and saline 1:4 for an indefinite time.

In transplantation of any of the types of preserved cartilages, small perforations in the cartilage will help to anchor it in place. Usually the operation is divided in five stages. At the first stage the cartilage is planted beneath the skin of the mastoid area through a curved incision in the hair line. In about two months the cartilage and skin are raised and brought forward, the underlying raw surfaces being covered with a thin split-graft. A double pedicle tube flap is made, in the neck, of suitable size and length. Three weeks later this flap is transferred to the edge of the new ear, attached so that it forms a helix. After a second three weeks the pedicle is returned to the neck or amputated. A tragus is formed by infolding a flap of skin on itself and covering the raw surface with a free graft. This procedure has been used for several years with satisfactory results.

The author presents photomicrographs of human and rabbit cartilage removed after being buried in the abdominal wall for varied periods of time. He also presents diagrams and an illustrative case of partial reconstruction of the ear.

BRADFORD CANNON, M.D.

Lempert, J.: Endaural Fenestration of the External Semicircular Canal for Restoration of Hearing in Cases of Otosclerosis: Summary Report of 120 Cases. *Arch. Otolaryngol.*, 1940, 31: 711.

The fenestration technique advocated by Lempert for the permanent restoration of practical physiological hearing in cases of otosclerosis is an endaural, plastic reconstruction of the auditory mechanism for the creation of a new air-conduction apparatus. It consists of (1) creation of a troughlike fenestra of specified length and width in the bony capsule of the external semicircular canal with the aid of a polishing and burnishing burr, and (2) the incorporation of this newly created fenestra in the external semicircular canal, which is to assume the function of the fenestra ovalis, within the confines of a newly reconstructed air-filled and hermetically sealed tympanic cavity.

That hearing can be improved by fistulization of the semicircular canal has been known for many years. The problem of maintaining the improvement, however, was a technical one awaiting solution. Because the anatomical structures involved are minute and do not permit great latitude in handling, only those who will take cognizance of the great importance of fine details of technical minutiæ in the solution of this problem can expect to be rewarded by the long-awaited successful results. There is no doubt that a simpler and less complicated technique ought to be developed to improve hearing in patients with otosclerosis; however, since one of the essentials of any technique developed will be the creation of a fenestra in the bony capsule of the labyrinth, the technique for the improvement of hearing will remain one of the most delicate and most difficult of accomplishment. In order to create the kind of fenestra which will result in permanent maintenance of the maximum degree of improved hearing obtainable on the operating table, the greatest amount of delicacy is necessary, and the operation will always tax to the utmost the patience and skill of any otologist.

Fenestration is indicated (1) when the loss of hearing is bilateral and progressive; (2) when the stapes within the fenestra ovalis is fixed but the membrane of the round window has remained normal; (3) when the hearing in the conversational frequencies has declined to a level which makes practical hearing of conversation impossible, while the hearing by bone conduction for these frequencies has remained normal or has declined to a level not lower than 30 decibels; (4) when the tympanic membrane is normal and completely intact; (5) when there is complete absence of infection in the middle ear; (6) when the eustachian tubes are patent; and (7) when the patient is in a normal state of health.

The fenestration operation has been performed by the author in 120 cases within the past two years. Permanent restoration of practical physiological hearing resulted in 69 cases. The 69 patients are now socially and economically rehabilitated. Marked improvement in conversational hearing resulted in 10 cases. Further impairment of hearing resulted in 14 cases. The hearing remained unimproved in 27 cases. In every case in which permanent restoration of practical physiological hearing was obtained after fenestration, tinnitus completely disappeared on the operative side. In cases in which the improvement did not bring the hearing to the practical level, the intensity of the tinnitus was greatly diminished. In cases in which the hearing was further impaired after fenestration, the tinnitus was proportionately intensified. Although the fenestra in the external semicircular canal remained permanently open in 100 of the 120 cases, the hearing was improved in only 79. Thus, in 21 of the 100 cases in which the newly created fenestra had not closed, the hearing nevertheless remained unimproved.

As a result of the author's technical observations he believes that there is no short technical route to successful surgical intervention for restoration of practical physiological hearing to patients with otosclerosis. He is not unmindful of the fact that the technique advocated is extremely involved and delicate and lends itself to many unusual possibilities for failure even in the hands of the most skilled otologist. However, when considering the fact that in order to restore the kind of hearing which can be of practical value to the patient, the mere creation of a fenestra, no matter how perfect, will not be sufficient and cannot result in serviceable hearing unless the fenestra is covered by a certain kind of viable membrane and unless the entire air-conduction mechanism is reconstructed to serve best ana-

tomically and physiologically the newly created fenestra, one must realize that no matter what modification can be made in the technique, such a technique will always involve difficulties heretofore not encountered in any other type of operation on the temporal bone.

In comparing the merits of fenestration versus hearing aids the following points are established:

1. Fenestration restores physiological hearing function, while a hearing aid amplifies the spoken voice without improving the auditory function.

2. There is sufficient evidence that fenestration retards and perhaps even checks loss of hearing. A hearing aid permits the loss of hearing to progress so that when the stage is reached in which the hearing aid ceases to be of value, surgical therapy is too late.

3. Tinnitus is eliminated by a successful fenestration operation. With a hearing aid the tinnitus remains unchanged.

4. Fenestration restores intelligibility of group conversation, while the hearing aid is confusing in group conversation.

5. After fenestration the patient can hear conversation or any other sound coming from any direction, even when not directed at him. With the hearing aid he can hear only person to person conversation directed toward the receiver of the hearing aid.

6. After fenestration, conversation is heard as it is normally spoken. Conversation with the hearing aid depresses the mental state still further.

7. Restoration of physiological hearing as a result of fenestration changes the entire mental state of the patient, whereas the wearing of a hearing aid depresses the mental state still further.

8. The hearing aid cannot be employed for direct telephone conversation.

9. The social and economic advantages obtained as a result of a successful fenestration operation are limitless. The hearing aid is a deterrent to social and economic rehabilitation.

10. The use of hearing aids cannot be compared to the use of visual aids because one is expected to hear conversation or any other sound directed toward oneself or anyone else, in and from any direction, even in sleep.

Finally, no surgical risk to life is involved in fenestration of the external semicircular canal when this surgical procedure is performed under the strictest rules of asepsis. As a result of this surgical procedure, practical physiological hearing has been restored in 80 per cent of properly selected cases of otosclerosis. No otologist, no matter how skillful a surgeon, should attempt this operation without special training in this type of procedure under supervision and guidance. NOAH D. FABRICANT, M.D.

NOSE AND SINUSES

Handousa, A. S.: Nasal Osteomas. *J. Laryngol. & Otol.*, 1940, 55: 197.

Of 840,000 patients seen during the past seven years at Kasr-El-Ainy Hospital, Cairo, Egypt, 37 had benign growths of the nose and sinuses and 18 of these were osteomas.

The age incidence was between twelve and fifty-four years, the majority of the patients being under twenty-eight years, and males were affected more often than females. The growths were practically all unilateral and usually single, arising from or attached to the frontal bone in 13 of the total 18 cases. They usually developed in the neighborhood of one of the epiphyses of the frontal bone and in this respect they followed the general rule of osteomas occurring in the long bones.

As to causation, syphilis and tuberculosis have been ruled out, but in 13 cases there was an associated inflammation of the sinuses.

Symptomatically these osteomas produce few findings except painless swelling, but in many cases there is exopthalmos and occasionally neuralgic pains are present.

The differential diagnosis is relatively easy with the aid of the x-rays.

The treatment is always surgical but the tumors should not be removed unless they give rise to symptoms. JOHN F. DELPH, M.D.

PHARYNX

Brunner, H.: Infections of the Parapharyngeal Space. *Arch. Otolaryngol.*, 1940, 31: 597.

The parapharyngeal space or pharyngomaxillary space occurs at the level of the nasopharynx. In order to study the anatomy of this space, three horizontal sections through the skull are used. The first section passes through the middle of the tonsils, the second through the inferior border of the parotid gland at the level of the mandibular angle, and the third through the maxillary sinus. The detailed description does not permit of abstraction.

This space is often infected. The source of the infection is usually inflammatory disease of the mucous membrane of the pharynx, particularly of the tonsils.

The symptoms are dependent upon (1) the localization and (2) the nature of the inflammation. In general, one can differentiate between two kinds of symptoms: (a) general, and (b) local. The local symptoms can be divided into (1) organic, and (2) mechanical symptoms.

The prognosis is dependent upon the constitutional resistance of the patient, the character of the inflammation, and the time at which the operation is performed.

Inflammatory diseases of the parapharyngeal space must be treated surgically. In cases of fulminant sepsis and typical phlegmon, only the external approach can be considered. In abscesses which have not progressed far, the endoral approach is justified. This must be performed in such a manner that the superior constrictor muscle is perforated and, as a rule, it is necessary to remove the tonsil. As for the external approach, Waldapfel made it clear that the surgeon must primarily drain the

abscess, the operation on the blood vessels being of secondary importance. Anesthetics, including avertin, are dangerous. Ether, apparently, is best, provided the mucous membrane of the upper respiratory tract is not inflamed.

The skin incision can be made along either the anterior border of the sternomastoid muscle or the horizontal branch of the mandible.

The author no longer performs a prophylactic mediastinotomy because the pus seldom granulates to the mediastinum; the patients succumb much earlier to the sepsis.

Surgery is not of much aid in the cases in which a phlegmon of the parapharyngeal space extends into the base of the skull. JOHN F. DELPH, M.D.

Barrington-Ward, Sir L., Kershaw, J. D., Rodgers, T. S., Collier, J., and Others: A Discussion on the Indications for Removal of Tonsils and Adenoids in Children. *Proc. Roy. Soc. Med.*, Lond., 1940, 33: 347.

BARRINGTON-WARD stated that tonsils are more dangerous than adenoids because they harbor infection; adenoids produce obstruction. The importance of adenoids is greatest in the early years of life. The indications for removal are repeated tonsillitis, chronic enlargement of the upper deep cervical lymphatic glands, which always indicate a tonsillar infection, and otitis media with its sequences. The indirect indications are rheumatism with its associated corditis, heart disease, chorea, and chronic sepsis. The least definite indications are the common cold and postnasal catarrh.

KERSHAW stated that conservative treatment should be tried on the small tonsil with mild symptoms, on the moderately enlarged tonsil with slight symptoms, and on the large tonsil with no symptoms. Operation is indicated upon a small tonsil with severe symptoms, on a moderate tonsil with mild symptoms, and on a large tonsil with slight symptoms. In case of doubt, conservative treatment should be tried, but the possibility of later operation must be kept in mind, because when the environment is such that conservative treatment is not likely to be persevered in there must always be a bias in favor of operation.

RODGERS gave only one indication for tonsillectomy in children, namely, repeated attacks of tonsillitis from which the patient does not recover completely in the intervals. Recovery of pathogenic bacteria from tonsils is of no importance. There is one indication for the removal of adenoids and that is nasal obstruction unyielding to conservative treatment. There are certain common conditions for which tonsils and adenoids are removed needlessly, namely, cold in the head, disease of the nose and sinuses, rheumatism, and nephritis. It was estimated that 200,000 tonsillectomies were done in England in 1937 with 85 deaths.

COLLIER stated that the views on the physiology of the tonsils do not give much practical help in making a decision as to treatment. It is known that this ring of subepithelial lymphatic tissue differs from ordinary lymph glands in having no afferent lymph vessels; otherwise it behaves like lymphatic tissue elsewhere. The germ centers, now more accurately called "reaction centers," do not develop in animals bred in a sterile environment, but appear only when bacteria and toxins invade the organism. For this reason it is concluded that protective antibodies are produced in the tonsils.

The chief problem for the laryngologist is to establish a relationship between the state of the tonsils and adenoids and the symptoms or disease from which the patient is suffering.

WOODMAN said that sufficient attention has not been given to the local condition of the tonsils in relation to operation. Mere size has nothing to do with the question. Great importance should be attached to deep sepsis, and his own method is to use a curved probe pressed on to the tonsil to ascertain its fixity.

RIDOUT said that there was need for a critical attitude toward statistics. In the course of twenty years and thousands of tonsillectomies in their hospital they have never had a case of lung abscess following the operation, and because of their follow-up system they would have been certain to know of it if it had occurred. It is important to bear in mind the nature and extent of the operation which was done. Cases of sinus trouble should always be carefully examined and the trouble removed. Very often it could not be stated whether there was sinus trouble until the patient was actually on the table. Each case must be considered on its merits.

HAJEK mentioned a series of cases in which acute or chronic attacks of rheumatism occurred whenever the patients developed tonsillitis. After tonsillectomy there were no such attacks, even the arthritic changes in the joints disappearing to some extent.

BRADLEY said that he believed the tonsillectomy rate in public schools quoted referred to tonsillectomies done before the child arrived at the school and not afterward. The Medical Research Council inquiry in this matter certainly referred in the main to tonsillectomies carried out before arrival at school. The impressions of those who worked in operating theaters were likely to be different from those of medical officers who looked after school children.

STEVENSON said that a speaker had suggested that it was the removal of the tonsil itself which caused pulmonary conditions such as chronic bronchitis. He thought that this might rather be ascribed to the inhalation of infected blood-clots at the operation. Unlike his colleagues, he had had 1 case in which lung abscess did follow tonsillectomy, but it was in an institution devoted to children with rheumatism and pulmonary disease. JOHN F. DELPH, M.D.

NECK

Zondek, H.: Fetal Function of the Thyroid Gland. *Acta med. Scand.*, 1940, 103: 251.

In diabetic mothers the metabolic rate may improve during the last month of pregnancy. It has

been observed that in children of diabetic mothers hypoglycemic conditions appeared immediately after birth, which often made it necessary to administer glucose immediately and to continue this treatment for some time. Few data are as yet available concerning the fetal secretion of the thyroid gland. The author has studied this question in connection with a case of hypothyroidism which was under his continuous care.

The patient was a woman thirty-three years of age weighing 67 kgm. She presented evidence of myxedema: her basal metabolic rate was −29, and her blood cholesterol 423 mgm. per cent. Under thyroidin treatment the basal metabolic rate rose to −7, and the blood cholesterol decreased to 212 mgm. per cent. The patient became pregnant and in the fourth month of pregnancy thyroidin treatment was discontinued. In the seventh month of pregnancy the basal metabolic rate was −3, and in the ninth month, −1. Five weeks post partum the patient had a severe recurrence of her myxedema with a basal metabolic rate of −29. Under thyroidin medication the symptoms subsided, but when thyroid medication was discontinued the symptoms recurred.

The author presents this case as the first concrete evidence of fetal thyroid activity.

EARL O. LATIMER, M.D.

Mahaux, J.: Basedow's Disease, the Pituitary Gland, and the Central Nervous System (Maladie de Basedow, hypophyse et système nerveux central). *Acta med. Scand.*, 1940, 104: 42.

Mahaux calls attention to the fact that when Basedow's disease was first described it was considered a disease of the nervous system and attributed to disturbances of the sympathetic nerves and the bulbar region. It was not until 1885 that Gauthier de la Charolle called attention to the rôle played by the thyroid gland. The importance of the thyroid is now recognized, but the cause of the overstimulation of the thyroid is still a matter of discussion. The close relation of the thyroid gland to the pituitary gland and the central nervous system is also recognized. The administration of thyroxin produces nervous symptoms similar to those observed in Basedow's disease.

Recent investigations have indicated that the pituitary gland contains a substance with an "affinity" for thyroxin that results in the fixation of thyroxin; the complex mixture thus formed eventually passes into the di-encephalon and mesencephalon. It appears to act particularly upon the centers in the region of the hypothalamus and on the extrapyramidal motor tracts. Many of the symptoms of Basedow's disease, such as ocular symptoms, motor excitability, and tremor, appear to be due to disturbances of the nerve centers in these regions. The author has seen 2 cases of Basedow's disease with oculomotor symptoms—diplopia in one case and interference with the downward movement of the eyes in the other case—which he attributes to disturbances in the di-encephalon. The symptoms in these cases were relieved by medical treatment, the medication including prominal, which has an elective sedative action on the di-encephalon.

The increased metabolism of Basedow's disease is attributed to the action of the thyroid secretion on the di-encephalic centers regulating thermogenesis. The maintenance of the heat regulation of the body results in an intensification of thermolysis by the peripheral vasodilatation and perspiration which are characteristic of Basedow's disease.

The "thyrotoxic" crisis that occurs after thyroidectomy is attributed to the sudden modification of the pituitary activity resulting from the loss of thyroxin from the circulation, and resulting in an excess of "thyrostimulin" which acts upon nerve centers sensitized by the previous excess of thyroxin. The logical treatment, on this hypothesis, would be the administration of thyroid extract in the postoperative period.

ALICE M. MEYERS.

Brøchner-Mortensen, K., and Møller, E.: The Cholesterol Content of the Blood Serum in Thyrotoxicosis. *Acta med. Scand.*, 1940, 104: 259.

In their study of a series of cases of thyrotoxicosis, the authors determined the basal metabolic rates and the cholesterol content of the blood. During their observations they found that the cholesterol content of the serum of patients with thyrotoxicosis generally lay within the limits of normal persons, although no proof was afforded by the material as a whole of any correlation between the serum cholesterol and the basal metabolic rate. Repeated examinations of about two-thirds of the patients showed that the serum cholesterol rose roughly at the same time that the basal metabolic rate fell and the patient's condition improved. In several of the remaining cases, the changes in the serum cholesterol were found to correspond more closely to the general clinical picture than to the changes in the basal metabolic rate.

The authors conclude, however, that the basal metabolic rate under normal conditions remains the criterion in the clinical examination of patients with thyrotoxicosis, both for the purpose of diagnosis and as a check on the efficacy of treatment.

EARL O. LATIMER, M.D.

Helfet, A. J.: A New Conception of Parathyroid Function and Its Clinical Application. *Brit. J. Surg.*, 1940, 27: 651.

The author has based his work on the theory that parathormone controls the blood inorganic phosphate level and prevents the blood phosphorus level from rising enough to upset the metabolic processes. However, an accumulation of phosphate in the blood is a stimulus to an increased production of parathormone. Parathormone effects its control by stimulating the excretion of phosphate by the kidney and by mobilization of the calcium ions from the bones. The calcium renders the phosphate inactive by combining with it. If the parathyroids

are removed the body is unable to deal adequately with the blood phosphate; there is a diminished excretion of phosphate and the calcium ions cannot be mobilized to combine with the phosphate to render it inactive and excretable.

The author goes into detail as to the basis for this theory. He believes the theory explains both the clinical and laboratory findings in hypoparathyroidism as well as in hyperparathyroidism.

Hyperparathyroidism is classified by the author into two types. Primary hyperparathyroidism is due to an adenoma and is typically represented by generalized fibrocystic disease with a raised blood calcium and a lowered blood phosphorus. Secondary hyperparathyroidism may be simple (compensatory or physiological) and pathological. The symptoms of the simple secondary type are mildly those of the primary type but there is no change in the blood calcium and phosphate levels and only hyperplasia causes a change in the parathyroid glands. Pathological secondary hyperparathyroidism is caused by the superimposition of an adenoma on the simple type, and the symptoms after removal revert to those of the simple type.

The author discusses the symptoms of hyperparathyroidism and the rôle of hyperparathyroidism in generalized fibrocystic disease. He also takes up the possible relationship between hyperparathyroidism and rheumatoid arthritis, as well as the relationship to osteitis deformans. The basis of his consideration of the relationship to rheumatoid arthritis is the good results he obtained in some of these cases with aluminum therapy.

The treatment of hyperparathyroidism is the reduction of the intake of phosphorus, the stimulus to overproduction of parathorome thus being removed. If a parathyroid tumor is present it should be removed. Since the phosphorus intake in the diet cannot be adequately reduced the author used aluminum salts to render the phosphates in the food insoluble. He found that aluminum acetate was the least astringent, but this must be carefully cloaked to be palatable:

Liquid aluminum acetate (B. P.)	40.00
Syrup	24.00
Ess. cherry conf. opt	0.25
Mel depuratum (B. P.)	120.00

The minimum dose of this prescription is 4 c.cm. four times a day after meals, and at least a pint of milk daily is prescribed. More recently aluminum gluconate has been used. These small doses are continued for months. The results in several cases of rheumatoid arthritis have been most gratifying. Only 2 of 15 patients failed to show any improvement in some manner. As low doses are used the results are slow to be manifested. There have been no cases of ill results from the small doses but the author warns that too large doses can produce rickets.

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THE EVALUATION OF IRRADIATION IN THE MANAGEMENT OF BRAIN TUMORS

Collective Review

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IRRADIATION has been used in the treatment of intracranial tumors almost since the beginning of the present century. Béclère and Gramegna reported successful results with hypophyseal tumors in 1909, and even before this Hilgartner, in 1903, had reported briefly the use of irradiation in a case of retinal glioma.

A survey of the published literature on this subject reveals a great deal of dissatisfaction on the part of all concerned (roentgenologist, neurosurgeon, and neuropathologist) with our present knowledge of the problem. Conclusions as to the actual benefit of x-rays or radium are still vague and based mostly on apparent clinical improvement following irradiation. Often this improvement has not been differentiated from that due to the preliminary decompression and perhaps partial removal of the tumor. Most of the writers have not found it possible to give the results in terms of a set of survival figures, and even when this has been done, the standards used for the survival figures have varied considerably.

From the standpoint of the literature, it is convenient to discuss the subject under four heads. These are retinal glioma, pituitary adenoma, meningeal and perineural fibroblastoma, and intracranial glioma. It must be emphasized that this is an arbitrary division with no justification except that of discussion of the literature.

The subject of retinal glioma is not properly included in a discussion of brain tumors, but anyone interested in the roentgen or radium therapy of intracranial gliomas can profit by a review of the experiences with these neoplasms. Apparently, Hilgartner's report represents the first attempt to treat a glioma of any sort with roentgen rays. No details of treatment are given except that the fractional method was used. The case was that of a three-and-one-half-year-old girl with a bilateral retinal growth that had caused blindness in both eyes. The tumor in the right eye almost completely replaced the vitreous. After the treatments were completed there was no visible tumor in the left eye and the tumor in the right eye had shrunken to two-thirds of its former size. No further report was made.

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In 1936 Martin and Reese reviewed the subject of the treatment of retinal gliomas. They were able to find reports of 2 five-year and 3 three-year cures in the literature. They added 2 more, one of an eighteen-month cure, the other of a two-year cure. They called attention to the following ophthalmoscopic changes: (1) cloudiness of the retina about the lesion due to edema; (2) alteration in contour of the lesion due to recession of the borders; (3) decrease in vascularity occurring after three or four months; and (4) calcification of the lesion. The end-stage reveals a chalky to pearly white, slightly elevated, avascular mass. These authors stated that the complications of the treatment were (1) hemorrhages, (2) retinal detachment, (3) atrophy of the globe, (4) cataracts which may appear years later, and (5) trophic changes in the skin or cornea.

Fewell and Fry studied histologically a retinal glioma from an eye enucleated because of recurrence. The patient had received 6,800 roentgens during the course of a year; enucleation took place three months after treatment was stopped. Some evidence of degenerative changes in the tumor cells was noted. The cytoplasm was scanty, the margins of the nuclei were not clear, the chromatin was stained irregularly, vacuoles were present, and nucleoli could not be distinguished. Mitotic figures could be seen in some of the areas that showed these degenerative changes.

Smaltino in 1936 also reported another case of five-year cure of a retinal glioma treated with roentgen therapy for over a year. The tumor completely disappeared and vision was restored. The patient was still well with no sign of recurrence five years later.

Because of the accessibility many of these retinal gliomas have been treated by the implantation of radon seeds. Stallard reported such a case with no sign of recurrence of the tumor after two years. He also described the histological appearance of a retinal glioma into which he had introduced a 3.5 millicurie radon seed ten days before removal of the eye. There was necrobiosis,

chromatolysis, granulation, and vacuolation of the tumor cells for a radius of 3 or 4 mm. in all directions from the seed. Moore, Stallard, and Milner described another case with enucleation six weeks after treatment (because of perforation of a corneal ulcer). There was complete destruction of the tumor, except for 12 small islands of glioma cells, each 0.1 mm. in diameter and situated around the periphery of the tumor. The rest of the tumor showed fibrosis and hyaline change with calcareous deposit. There were hemorrhages, congestion of the blood vessels, and mild leucocytic infiltration.

The reports of successfully treated cases of retinal glioma must be contrasted with the reports of spontaneous regression of these tumors. Martin and Reese found many more of the latter in the literature than they did of cures with irradiation. They believed the cases of cure represented tumors that were unusually sensitive to irradiation. However, in both groups of cases histological verification of the diagnosis is lacking. On the other hand, in many of the cases of reported failure, treatment was inadequate or the disease far advanced before treatment was begun.

It would appear, both from the evidence of the occasional well-established cure (Knapp's case) and the histological evidence in tumors removed after irradiation that cure is possible in cases of retinal glioma. Treatment must be begun early, be prolonged, and be adequate. From the literature it would appear that the primary use of irradiation in unilateral glioma (as suggested by Wheeler, Key, and Ewing in discussion of the paper by Martin and Reese) is justified. In the past, irradiation has usually been used prophylactically on the orbit after enucleation, or on the second eye after enucleation of the first in bilateral cases of retinal gliomas.

Apparently, the first intracranial tumor to be treated by irradiation was a pituitary adenoma (Béclère and Gramegna), and it is perhaps fitting that of all intracranial tumors the irradiation of this one is on the firmest basis. Béclère considered irradiation as the treatment of choice for pituitary adenoma. Hirsch reported 132 cases treated by operation followed by radium. He obtained good results in all but the cystic tumors. This author did not advise the use of radium without preliminary surgery if the visual fields are involved. Dyke stated that all the pituitary adenomas are radiosensitive, but that the chromophil type is more sensitive than the chromophobe. Nuvoli was encouraged by the results of irradiation of pituitary adenomas. He suggested the primary use of irradiation unless vision was rapidly failing, when operation should be done without delay. Sosman presented evidence that, if visual impairment had been present for over a year, the chances of recovery were poor with either surgery or x-ray. He reported the treatment of 14 cases of chromophobe adenoma with irradiation alone. Four cases were hopeless from the start because of extensive invasion or intracranial extension (3 of these terminated fatally in three months). Ten cases were suitable for analysis; in 2 of these, therapy was too recent for evaluation at the time of the report. Seven of the remaining 8 patients received marked benefit both as to the restoration of vision and return of the patient to normal living. The duration of improvement had lasted from three to five years with no recurrences at the time of the report. A number of isolated case reports of long periods of remission of symptoms of pituitary adenomas after the use of irradiation have been made (Gendreau). It must be kept in mind, as Sosman pointed out, that a survival period of three, five, or even ten years is not sufficient in cases of these tumors to warrant a boast of good results as it would be in cases of malignant tumors. Good results in cases of pituitary adenoma mean restoration of health, and, especially in the chromophobe type, restoration or preservation of vision.

It is the opinion of the writer that irradiation is the treatment of choice for chromophil adenomas which produce acromegaly (gigantism in adolescents), for in these cases visual field defects are rare. It should be the primary treatment in cases of chromophobe adenoma in which there are no visual field defects, but these cases must be closely followed and frequently examined for such defects. If visual impairment is rapidly progressive, surgery is the treatment of choice and is to be followed by irradiation as there is evidence to show that the good results following surgery can thus be prolonged and recurrence postponed or prevented. If visual loss has been slowly progressive, irradiation may be given a trial as a primary therapeutic measure, but the visual fields should be carefully examined after a brief period (three or four weeks). If improvement has not taken place, surgery should be resorted to without delay. Grant has well emphasized that it is not sufficient for irradiation to hold the loss of vision stationary. In such a case, when further visual loss occurs, the surgeon may be confronted with a large spreading tumor—a hopeless situation from the standpoint of surgical cure and one bearing a high mortality rate. The immediate good results of surgery are well known—it is not too much to ask that irradiation furnish early

improvement in vision. Another caution must be added, viz., to keep close watch on the patient during irradiation. Sudden further loss of vision due to edema or hemorrhage during irradiation is a rare but recognized complication. Immediate operation should be performed if this occurs.

The subject of the irradiation of meningeal and perineural fibroblastomas can be dismissed with the observation that, aside from occasional unsupported statements in the literature that certain cases of these neoplasms may be benefited by roentgen treatment, there is no evidence that it is of any value. Dyke, for example, states that meningiomas of the fibroblastic type (resembling spindle-celled sarcomas) respond to x-ray treatment; Loew-Beer reported a two-year and three-year cure, respectively, in 2 cases of meningioma; Nuvoli says meningeal tumors sometimes respond very favorably to irradiation. Other writers that mention these tumors at all only do so to state that irradiation is of no value. Angiomas have been routinely treated with x-rays in many clinics—certainly they are very unsuitable for surgical treatment. The writer has no knowledge of any worthwhile results obtained by irradiation.

The effect of irradiation has been studied more thoroughly on the gliomas than on any other group of intracranial tumors. Ewing's prediction in 1921 that those tumors exhibiting marked anaplastic tendencies would be more radiosensitive founded the hope that irradiation of the gliomas would prove uniformly successful. Unfortunately, this did not prove to be the case. Bailey in a report in 1925 mentioned the results in 4 gliomas, 2 of the frontal lobe, 2 of the cerebellar vermis. In 1 of each, irradiation brought about marked clinical benefit, in the other no benefit at all was obtained. The publication of a classification of gliomas the following year (1926) by Bailey and Cushing paved the way for explanation, at least in part, of the differences in clinical response of different gliomas to irradiation. Since that time the significant articles on the subject have all approached the question from the pathological standpoint.

Pancoast pointed out certain characteristics of gliomas which make them suitable for irradiation, viz., (1) they grow slowly and practically never metastasize; (2) often part of the tumor can be removed to give temporary relief and the rest irradiated (this would be considered poor surgery in other parts of the body); (3) exploration of the tumor and biopsy may be followed by irradiation if the location or type of the tumor makes it unsuitable for surgical removal; (4) if the tumor is not found at operation it can still be treated with irradiation, although admittedly at a disadvantage; (5) if no tumor is found, decompression will give temporary relief from symptoms while irradiation is in progress; (6) a large proportion of gliomas can be regarded as being made up of radiosensitive cells (this is, however, not founded on fact); and (7) normal brain tissue is quite resistant to irradiation.

Practically all authors, except a few overenthusiastic ones, such as Béclère, emphasize the importance of preliminary exploration with biopsy (if possible) and decompression before irradiation is begun. Albrecht suggested preliminary puncture biopsy followed by surgical removal or irradiation, as the pathological type of tumor indicated. However, most neurological surgeons in this country would frown on such a procedure both because of its inadequacy from the diagnostic standpoint and the dangers of hemorrhage associated with blind puncture of the brain.

The reasons for advocating preliminary operation are well recognized.

1. Otherwise one may not be dealing with a tumor at all but with some condition simulating neoplasm. The neurological surgeon is all too familiar with various conditions causing the syndrome of so-called "pseudotumor."

2. Clinical localization may be at fault and may be corrected only by surgical exploration.

3. Exploration may disclose the lesion to be one that has a good operative prognosis, but is very resistant to the x-rays. If such lesions are given a therapeutic trial of irradiation as advocated by some enthusiastic radiologists, valuable time will be lost and an otherwise operable tumor may become inoperable.

4. Partial or subtotal removal of the tumor or decompression will give relief of symptoms until the effect of irradiation can be obtained, and will provide for the relief of the increase in intracranial pressure due to the effect of the x-rays.

The question of the relative value of radium and high-voltage roentgen rays has been much discussed. The greater technical difficulties and dangers associated with the use of radium and the progress made in improvement of the technique of the use of high-voltage roentgen rays has practically resolved the problem in most clinics in favor of the x-rays. Modern technique makes it possible to so closely approximate the gamma ray of radium, even at considerable depth, that there is apparently now little practical advantage with radium to offset the greater difficulties of its application, especially its interstitial application.

The microscopic changes in both tumorous and normal brain have been studied for both radium and the x-rays. In this respect at least there is considerable agreement among the writers. Davis and Cutler studied the effect of radium implanted in the brains of cats and dogs and one monkey. They found a zone of thrombosis of small vessels for a radius of 3 mm. about the radium implant. Within a 2 mm. radius there were numerous "gitter" cells loaded with fat and marked demyelinization. In this zone, destruction of the nerve cells and the absence of Nissl granules were noted. Later the "gitter" cells disappeared; astrocytes and oligodendroglia took their place, and neuronophagia was noted. Unfortunately, control experiments with the implantation of needles free from radium were not described.

Colwell and Gladstone carried out studies on the effect of radium on the brains of eighteen-month-old rats. They described the changes as essentially those of a non-suppurative reactionary inflammation. The immediate effects were a vascular engorgement with escape of erythrocytes from the vessels but not lymphocytes. Twenty-four hours after irradiation there were proliferation of vascular endothelium and perivascular accumulations of small round cells. There was also evidence of localized stases. As a late result there was contraction of the arterioles in certain areas with interference of the blood supply and resultant patches of necrosis. Damage to the nerve cells, especially the larger ones, was apparent early after irradiation. There was a change in the staining reactions. Later there were disintegration and total destruction of the nerve cells.

Williamson, Brown, and Butler studied the effect of radium implanted beneath the skull on the motor cortex of dogs in a dosage of 500 mgm. hrs. Observations made three weeks later showed all of the cells to be destroyed and fragmented within a radius of 5 mm. Surrounding this area was a hemorrhagic zone. The hemorrhages were due to rupture of degenerating walls of blood vessels. Outside of the hemorrhagic zone there was a zone of slight hyperemia.

Alpers and Pancoast referred to the changes in normal brain tissue adjacent to tumors after irradiation with high-voltage roentgen rays as consisting of fatty degeneration of the cells of the cortex or of the Purkinje cells of the cerebellum and mild fiber loss in the cerebral cortex. It must be kept in mind that various degenerative changes in both blood vessels and nerve cells are not uncommonly found in the brain adjacent to a tumor.

Lyman and his coworkers gave high-voltage roentgen rays (20 human erythema doses) to dogs. Six weeks later they found degenerative changes in the capillaries and precapillaries. One dog was kept for six months and showed clinical evidence of diffuse cortical and subcortical damage. Microscopic examination showed an obliterating sclerosis of the smaller vessels with consequent areas presenting incomplete and complete necrosis.

Scholz and Hsü irradiated 2 young patients presenting schizophrenia with deteriorization using 4 erythema skin doses through 6 portals in three days. They died a year and a half later without showing any definite focal neurological disturbances. The brains showed severe damage due mostly to circulatory disturbances. There were numerous areas of necrosis and severe fibrosis of the vessels and deposition of peculiar homogenous substances in the walls of the vessels and the surrounding nerve tissue, and the changes in the walls of the vessels resembled hyaline changes. The authors referred to the cases of Fischer and Hoefelder and of Markiewicz, in which late degenerative changes in the brain were observed after intensive irradiation of the scalp. Focal epilepsy developed in both cases, and examination revealed numerous old hemorrhages and areas of necrosis and deposits of homogenous substances in the walls and around the vessels. These deposits were interpreted as amyloid deposits by Fischer and Hoefelder.

We must conclude that the normal brain can be damaged by irradiation, although with the ordinary therapeutic doses such damage must be minimal. In patients treated intensively and surviving for long periods, the possible late effects must be kept in mind. Some authors, notably Béclère, have stated that irradiation diminishes the formation of cerebrospinal fluid and thus relieves increased intracranial pressure even when the tumor itself is not radiosensitive. However, if this were true, irradiation would be a valuable treatment for idiopathic hydrocephalus, when, as a matter of fact, it is of no value.

Critical analysis of the effects of radium or high-voltage x-rays on various gliomas reveals little positive proof of definite effect except for one type of tumor, the medulloblastoma. Changes that are said to occur as the result of irradiation include reduction in cellularity of the tumor, increase in fibrous tissue, reduction in the number of mitoses, and appearance or increase of giant cells. There is a variable amount of thickening of the walls of the vessels with an increased tendency toward areas of necrosis. However, it must be taken into account that there is great individual variation in the factors mentioned

even in gliomas of the same group and in different areas of the same tumor. Further, spontaneous changes of the types mentioned are common to all gliomas. On the other hand, many cases that have been studied and reported were inadequately treated by present standards. For example, Frazier and Alpers collected 114 cases of glioma from several neurosurgical clinics in which preradiation and postradiation histological specimens were available. Their criterion of adequate treatment was the administration of 2,000 or more roentgen units—obviously their conclusion that treatment was inadequate in most of the cases was eminently justified. These authors quoted Packard to the effect that the first effect of irradiation on cells is physical with changes in the hydrogen-ion concentration of the protoplasm, in permeability of the cell membrane, and in the viscosity and respiratory rate of the cell. The secondary effect is morphological and includes clumping of the protoplasm and shrinking and agglutination of the chromosomes. These changes are reversible. Further changes are vacuolization of the protoplasm and fragmentation of the mitochondria; these are irreversible.

With the exception of Davis and Weil there is fairly uniform agreement among workers that the medulloblastoma is the most radiosensitive of gliomas. The authors mentioned found it least affected in their study. The writer has personal knowledge of 2 cases of medulloblastoma of the cerebellar vermis that received intensive high-voltage roentgen treatment to the cerebellum and routine treatment of the spinal canal and cerebrum. When signs of recurrence developed additional treatment was given to the cerebellum. Necropsy in both cases showed death to be due to tumor implants in the cerebral hemispheres, in one case in the lateral ventricles, in the other in the cerebral subarachnoid spaces. In both cases there was no local recurrence in the cerebellum. In one there was no gross evidence of tumor in the posterior fossa, in the other only a small nodule was present in the fourth ventricle. The importance of thorough irradiation of the entire cerebrospinal axis cannot be overemphasized in these cases. This is not necessary in other gliomas as this is the only one to spread by implants.

Some writers have reported considerable change in ependymomas as a result of irradiation, others have reported them highly resistant to irradiation. The same discrepancy is present in reports of the effects on glioblastoma multiforme.

When we come to the astrocytomas, oligodendrogliomas, and polar spongioblastomas, there is little evidence of clinical benefit from irradiation and no good evidence of histological change as a result of irradiation.

As already mentioned, many of the reports emphasize the clinical improvement or the increased survival period following irradiation, but fail to take into account differences in location and size of the tumor, in the extent and type of surgery performed, in the difference of histopathological interpretation from clinic to clinic, and in the technique and dosage used in treatment. The writer's knowledge of the latter is entirely second-hand, but it is obvious from the literature that the variations in this factor equal, if not exceed, those in the others mentioned.

Radium can be used either by means of implantation or the surface pack. The latter would appear to have little advantage over high-voltage roentgen rays except in children or in irrational or uncoöperative patients. The use of radium implants would appear to be the most ideal of all methods of irradiation from the standpoint of concentrated effect on the tumor cells. The technical difficulties constitute the chief objection. The difficulty of accurate delimitation of subcortical tumors and accurate implantation of radium element, the necessity for re-opening the wound for removal of the radium, and the dangers of severe injury or hemorrhage in normal brain tissue if the implantation is carried out too near the edge of the tumor are among the difficulties noted. Pancoast warns concerning implantation near the edge of the tumor for the reason stated above. Obviously, however, since the active growth of a glioma is at its periphery, radium implantation will never control a glioma if this precaution is followed.

The present trend in all but a few clinics is to administer high-voltage roentgen rays in fractional doses through multiple portals in much larger total amounts than in the past. Doses of from 150 to 250 roentgen units given daily through as many alternate portals as possible for a total of at least 5,000 roentgen units and repeated in from three to six months in cases which are known to be radiosensitive or show clinical improvement is the method used, in the institution of which the writer has personal knowledge.

Great interest attaches to the work being carried on by Sachs and Elsberg, independently, in the irradiation of tumors through an open craniotomy wound. Here, of course, is a reversion to single massive doses given directly to the exposed brain. As yet the reports of the results are too scanty to warrant any conclusions concerning this method, but it is a serious attempt to improve on our present technique of irradiation.

The dangers of irradiation may be listed as (1) injury to the skin, (2) radium osteonecrosis, (3) depilation, (4) sloughing or delayed healing of the operative wound, (5) injury to normal brain tissue, and (6) reactions to treatment. Damage to scalp or bone and sloughing or delayed healing of the wound should not occur in the hands of competent radiologists. However, it is wise to allow primary healing of the operative wound before commencing the irradiation. Loss of hair is unavoidable and with adequate treatment will in most cases be permanent. It, of course, is negligible in comparison with the gain in successfully treated cases. Injury to normal brain tissue has already been discussed, and must be kept in mind, particularly with the present-day tendency toward increasingly large doses of irradiation. Reactions to treatment are probably usually due to edema or vascular changes in the tumor. Preliminary decompression is of great value in preventing or mitigating them. However, at times it may be necessary to administer hypertonic solutions intravenously or to do spinal or ventricular drainages to counteract symptoms of increased intracranial pressure during or following irradiation. Again, the spacing of treatments several days apart may be of value in preventing adverse reactions.

In conclusion, it may be stated that irradiation cannot be substituted for surgery in the treatment of intracranial tumors. In certain tumors, such as retinal glioma, pituitary adenoma, and medulloblastoma, it may not only keep the growth under control, but even offer promise of cure. It is of no value in meningeal or perineural fibroblastoma, astrocytoma, oligodendroglioma, or polar spongioblastoma. Glioblastoma multiforme, ependymoma, or angioma may show some favorable clinical response. There is no true evidence that the formation or absorption of cerebrospinal fluid is influenced by irradiation.

In the present stage of our knowledge, except in cases of certain tumors with characteristic clinical syndromes such as the pituitary adenoma, exploration with decompression and, if possible, biopsy should precede irradiation.

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SURGERY OF THE NERVOUS SYSTEM

BRAIN AND ITS COVERINGS; CRANIAL NERVES

Pérez Zabala, M.: Dilatation of the Blood Lakes of the Dura Mater or Venous Aneurysm of the Longitudinal Sinus (W. E. Dandy): Anatomico-surgical Study (Dilatación de los lagos sanguíneos de la duramadre o aneurisma venoso del seno longitudinal (W. E. Dandy): estudio anatomoquirúrgico). *Bol. inst. de clín. quir.*, Univ. de Buenos Aires, 1940, 16: 13.

Pérez Zabala discusses the venous circulation of the dura and calls attention to the presence of venous lakes in the thickness of this membrane. These lakes are usually developed on each side of the upper longitudinal sinus, especially at its central part, and their cavity, which has the form of an irregular ampulla and is always enlarged in the anteroposterior direction, is traversed in all directions by numerous connective-tissue tracts which run from one wall to the other; in most cases, the cavity contains some Pacchioni granulations. The lakes communicate with the sinus by means of round or elliptical orifices or of real canals which may reach a length of 1 or 2 cm. Usually, the meningeal veins empty into the lakes, while the cerebral veins run in the pia and consequently below the lakes and empty directly into the sinus; the upper aspect of the lakes emits diploic and emissary veins. From the point of view of their anatomical significance, the blood lakes of the dura are simply diverticula of the venous system into which an excess of blood of the sinuses or of the cerebral veins may be disgorged and compression of the nervous centers thereby prevented. Careful review of the anatomical data given by Dandy in the description of his 3 cases of venous aneurysm of the longitudinal sinus shows that these data correspond exactly to those of the venous lakes of the dura.

The aneurysmal sac acts on the brain and on the cranial bone. It causes symptoms of irritation, paresis or paralysis of the leg and arm, and, in addition, headache after meals or after any effort which increases the intracranial venous pressure, accompanied at times by abnormal visual sensations. In the bone, it causes a process of destruction and reconstruction which reduces the thickness of the bone and raises the external table above the surrounding parts; on palpation the bone may be so thin as to allow the perception of pulsations. Roentgen examination reveals a typical picture of loss of substance of the bone; the three layers may be involved and the external table may be reduced to a thin, bulging lamella. This type of loss of substance with softening of the external table is practically pathognomonic of dural aneurysm.

The author reviews the 3 cases reported by Dandy and describes a personal case in a student, aged eighteen years, who first noted strange sensations in his head after meals or effort and, at times, visual disturbances (false luminous perceptions) and frontal headaches. During the past six months, the strength of his right arm had decreased; he had never had epileptic attacks. Examination disclosed a swelling, having the consistency of parchment, in the vicinity of the median line of the cranium; careful palpation revealed pulsation, and pressure on the swelling caused a disagreeable sensation which could not be called decidedly painful by the patient. Roentgen examination showed the typical picture of bone destruction. A venous aneurysm of the dura was found at operation and, for particular reasons, was treated with a strychnine gauze tampon which was left protruding from the anterior angle of the wound. The wound was sutured in two planes. Removal of the tampon was started on the eighth day and finished on the twelfth day; healing was complete on the fifteenth day. Follow-up examination, ten months later, revealed nothing abnormal.

The absence of previous epileptic attacks in this patient was considered as sufficient reason to avoid extensive excision of the dura over the cerebral motor zone and replacement with a graft of fascia lata, because this technique might have resulted in the production of epileptic attacks or in the aggravation of the paresis. It was thought better to eliminate simply the action of the pulsation on the brain by removing the bony shell and by treating the venous dilatation as in the case of sclerosing therapy of varicose veins, the strychnine gauze serving as irritant for the walls of the aneurysmal sac.

The author concludes that the term "dilatation of the blood lakes of the dura mater" should replace that of Dandy (venous aneurysm of the longitudinal sinus) and of Peiper (venous aneurysm of the dura mater).

RICHARD KEMEL, M.D.

Groff, R. A., and Grant, F. C.: The Surgical Treatment of Brain Abscess by Exposure and Enucleation. *Ann. Surg.*, 1940, 111: 925.

The surgical treatment of brain abscess is a subject that has caused much discussion, and Groff and Grant make a convincing plea for the use of surgical exposure and actual enucleation of such lesions.

They review 7 of their cases treated by this method, 4 patients with single abscesses, and 3 with multiple abscesses. One of the patients with a single abscess had the ordinarily avoidable complication of osteomyelitis of the bone flap, but all of the patients had such a smooth convalescence that the authors recommend uncapping and enucleation of the lesion as the most satisfactory treatment for brain abscesses *which have a firm wall*. Cerebral herniation, cerebral fungus, a great increase in the intracranial pressure, and prolonged dressing, all of which may be encountered when drainage methods

are employed, are avoided when the abscess is removed completely within its unruptured wall. Multiple abscesses present a different problem, since they may be in different stages of development; therefore not all of them can be walled-off completely, or they may not all be located. One such patient in this series died of meningitis.

Abscesses resulting from a primary focus of infection, such as a mastoid or a sinus condition, and having a stalk leading from that focus to the abscess cannot be treated by the method of exposure and enucleation at any stage of the infection, since disturbance of this tract is certain to cause meningitis.

JOHN MARTIN, M.D.

SPINAL CORD AND ITS COVERINGS

Donald, J. M., and Morton, B. F.: The Scalenus-Anticus Syndrome with and without Cervical Rib. *Ann. Surg.*, 1940, 111: 709.

The authors describe 21 severe and 19 mild cases of the cervical rib and scalenus-anticus syndrome. Of the severe cases 5 were associated with cervical rib or abnormal rib, and 16 were associated with abnormal scalenus anticus. The duration of the symptoms varied from six weeks to eleven years and the symptoms were essentially the same, except for the more prominent objective signs in those cases having cervical ribs. The most consistent symptoms were pain, numbness, tenderness on pressure over the scalenus-anticus muscle, slight to marked muscular weakness, and occasional atrophy, with disability due chiefly to the increased pain on motion of the extremity rather than weakness. In addition many of the cases presented inhibited or lost tendon reflexes and diminution of the cutaneous sensibility either over the ulnar or median distribution or over both.

Many of these cases showed vascular changes. These consisted of elevated or lowered blood pressure of the affected side, diminution or absence of the pulse, bruit over the supraclavicular areas, and gangrene. In the majority of instances the radial pulse could be obliterated or greatly diminished by having the patient turn the head toward the involved side and take a deep breath, or by deep pressure over the insertion of the scalenus anticus.

The symptoms are the result of compression of the brachial plexus and subclavian artery by the scalenus-anticus muscle. They are precipitated by trauma, occupational strain, and improper posture in patients having inherent anatomical and developmental variations about the shoulders. The syndrome appears to be more frequent than is realized and is a common cause of brachial-plexus neuritis and unexplained vascular disturbances of the upper limbs. The results following tenotomy are excellent with most of the patients being completely relieved of symptoms. Scalenectomy is not indicated in mild cases as these usually respond to conservative therapy. Remissions and exacerbations of the symptoms are characteristic of mild cases. In view of the essential identical etiological factors and clinical pictures of the scalenus-anticus and cervical-rib syndromes, the authors suggest that the term "scalenus anticus syndrome" be applied to both conditions, and the presence of a cervical rib, if present, specified.

DAVID J. IMPASTATO, M.D.

Rasmussen, T. B., Kernohan, J. W., and Adson, A. W.: Pathological Classification, with Surgical Consideration, of Intraspinal Tumors. *Ann. Surg.*, 1940, 111: 513.

A review of a large series of intraspinal lesions for which operations were performed at the Mayo Clinic reveals a preponderance of benign tumors which were operable. The earlier intraspinal tumors are recognized, the less will be the damaging effects on the spinal cord and the more complete will be the recovery of the patient when the pressure has been relieved by the removal of the tumor. The factors responsible for the development of tumors of the meninges, nerve roots, blood vessels, and the spinal cord are similar to those responsible for the development of tumors elsewhere.

The first phase of the symptoms of extramedullary tumors is that of involvement of the nerve roots; the second, that of beginning compression of the spinal cord; and the third, that of extreme compression of the spinal cord, which produces the clinical picture of transverse section of the cord.

Intramedullary tumors rarely produce pain, but pass directly into the second symptomatological phase. The sensory and motor disturbances are progressive until a definite transverse level becomes evident. The upper sensory level is less distinct than that produced by extramedullary tumors. Increased reflexes and loss of vesical and rectal control appear early in the syndrome.

The symptoms which play important parts in the diagnosis of intraspinal lesions emphasize the necessity of a comprehensive history in all cases. Following the taking and recording of the history, a detailed general, as well as a neurological, examination is necessary. These examinations should include such special features as spinal puncture, Queckenstedt studies, and roentgenograms of the spinal column, with or without the introduction of iodized oil.

Up to January 1, 1939, there had been performed at the Mayo Clinic operations for 557 verified intraspinal neoplasms. These lesions have been classified pathologically and grouped according to location. There were 163 cases of neurofibroma, 140 of meningioma, 64 of intramedullary tumors, 55 of sarcoma, 47 of extramedullary hemangio-endothelioma, 32 of extramedullary ependymoma, 23 of chordoma, and 33 of miscellaneous extramedullary tumors. The intraspinal lesions were situated as follows: in the cervical portion of the spinal column, 100 cases; in the thoracic portion, 304; in the lumbar portion, 117; in the sacral portion, 35; and at multiple levels, 1 case. It is apparent that the distribution of these tumors with reference to the spinal axis has no predilection for any one region. Neuro-

fibromas constitute the largest single group; meningiomas, the second largest group, and their primary distribution is in the thoracic region.

In addition to the described verified intraspinal tumors, there were 468 additional intraspinal lesions which produced irritation or compression of the nerve roots or the spinal cord, suggesting, clinically, the possible existence of an intraspinal tumor or compression of the nerve roots and spinal cord by a non-neoplastic lesion. Among the 468 lesions there were 64 intramedullary lesions, presumably tumors or cysts of the spinal cord, which were not identified by biopsy. There were 29 additional, unclassified lesions situated within the spinal canal. The tissue removed to date has not been pathologically classified. In this same group of 468 cases, there were 377 non-neoplastic lesions, which included protruded intervertebral disks, osseous compression of the roots and spinal cord, and suppurative lesions (abscesses) within the spinal canal.

The technique of a laminectomy has become standardized and, therefore, a detailed description is unnecessary.

Hemilaminectomy is definitely indicated in removing lesions of the cervical portion of the cord. When it does become necessary to perform bilateral cervical laminectomy, extreme care should be exercised in closing the incision so that the cut edges of the ligamentum nuchæ will be accurately approximated.

Since neurofibromas may arise from the nerve roots within the dura, from the roots as they penetrate the dura, or from the peripheral nerve just lateral to the dura, it will be found that these lesions may be situated wholly within the spinal canal, intradurally or partly within the dura, and partly outside of the dura, or they may be situated extradurally with an enlargement and a protrusion into the intervertebral foramen, or they may present the typical dumb-bell appearance, with one portion within the spinal canal just described and a similar projection beyond the intervertebral foramen. Neurofibromas situated in the spinal canal, even though they have eroded the bone around the intervertebral foramen, usually can be removed in a one-stage operation. Those which are dumb-bell tumors and are situated in the cervical region of the canal are more effectively removed through two separate incisions, and the extraspinal portion of such a tumor is removed first through a lateral cervical incision. Many of these so-called dumb-bell tumors involve the thoracic nerves.

Since both laminectomy and thoracotomy are major operations, it has been our practice to perform laminectomy and remove the intraspinal portion of the tumor first and wait for the patient to convalesce thoroughly from the first operation before performing the second. This period of waiting usually extends over a month or two.

Most neurofibromas within the spinal canal have a tendency to degenerate and become cystic, and in a number of instances, in the lumbar region, the neurofibromas have been known to grow to considerable size and erode laminæ, pedicles, and bodies of the vertebræ without producing signs of complete paraplegia. Neurofibromas involving the roots of the spinal cord are usually singular, but occasionally may be multiple and may be part of von Recklinghausen's disease.

Meningiomas, fibroblastomas originating from the arachnoid, may be situated in any portion of the spinal canal and in any part of the circumference of the canal about the cord, and produce pressure at the point of origin. The most common site of origin of such a lesion is about a nerve root, but not originating from it. The meningeal attachment is usually rather limited, although the tumor may grow in all directions without becoming attached to the cord.

Following the removal of meningiomas and neurofibromas, the surgeon frequently observes marked indentations of the cord. Complete recovery of the patient will take place if the blood supply of the cord has not been destroyed.

The surgical consideration of intramedullary tumors applies almost entirely to the entire group of lesions, even though they may vary in their pathological classification. Most of them are gliomatous in origin. The largest group is ependymomas. These tumors originate from the ependymal cells lining the central canal. Unless cystic degeneration has taken place in or about the tumor, the surgical approach is the same for all intramedullary tumors. It is impossible completely to remove gliomatous lesions of the cord, since there is no line of demarcation permitting enucleation.

Ependymomas originating within the filum are not encapsulated, but they are surrounded by pia mater. They produce marked erosion of the bone without invading it, grow in between the nerve roots of the cauda equina, increase the size of the lumbosacral canal, may enlarge the intervertebral foramen, and grow into the soft tissues of the back—but they apparently do not metastasize. The surgical problem is to perform extensive laminectomy in order thoroughly to uncover the tumor, and then to proceed with careful dissection and removal of the tumor without impairment of the blood supply or damage of the nerve roots. Complete removal will result in a cure; failure to accomplish this will result in recurrence.

Following the operation, the patient is placed in bed in the lateral position on pillows, to avoid undue pressure on the tips of the shoulders and on the hips. It is preferable to turn the patient from side to side and on the abdomen, rather than to allow him to lie on his back, because sweating may result in maceration of the skin and contamination of the incision, and may interfere with primary union. The patient, otherwise, is treated as is the average surgical patient.

The frequent occurrence of primary intraspinal tumors, which are usually benign and operable, justifies thorough examination of all patients who complain of root pain or of progressive motor or

sensory disturbance of the extremities. The diagnostic methods at our disposal will invariably affect the differential diagnosis. Surgical treatment, if it is to be instituted, should be employed before the patient becomes paralyzed.

PERIPHERAL NERVES

Lapiński, Z.: Spinal Cord as a Dead Transplant in Defects of the Peripheral Nerves (Rueckenmark als totes Transplant bei Defekten von peripheren Nerven). *Polski przegl. Chir.*, 1939, 18: 445.

The author undertook the continuation of experimental studies of Gosset and Bertrand on heteroplastic spinal-cord transplantation for loss of substance of the peripheral nerves. In 5 dogs transplantations were made with portions of spinal cord from 1 to 3 cm. in length, which were prepared according to the method of Gosset; on 1 control animal the cutting of a nerve was immediately repaired by an end-to-end suture. The extremity regained its function after from five to six weeks but was never restored completely; the leg remained a trifle weaker and the animal was not as certain in its use. After from fifty to eighty days the implant was examined microscopically and the author concludes:

1. Spinal cord is a good heteroplastic transplantation material because it contains very little connective tissue and because it has a rope-like structure.
2. Only the white substance of the spinal cord has practical significance in the regeneration of nerves.
3. The regeneration of the nerve is not slower than that with simple nerve suture.
4. The number of nerve fibers after transplantation is the same in the peripheral end as after simple nerve suture.
5. The transplant does not delay wound healing.

(L. Tonenberg). Leo A. Juhnke, M.D.

Koestler, J.: Results of Animal Experiments with Operations Utilizing Prepared Substitutes for Defects from Nerve Injuries (Ergebnisse des Tierversuches bei vorbereitenden Eingriffen zur Ersatzoperation bei Nervenschaeden). *64 Tag. d. deutsch. Ges. f. Chir.*, Berlin, 1940.

According to Gebhardt one of the main reasons for failure of operative procedures on injuries of the peripheral nerves is the trophic, tonic, and vasomotor disturbance in the involved limb portion. To influence this disturbance it seemed that the continuation of experiments begun by Felix on the diaphragm of the dog were in order.

The tibial nerve was chosen for the experiments. After the severance of this nerve its distal stump was inserted into the sympathetic-parasympathetic plexus surrounding the large vessels, in the so-called vegetative or autonomic system, to see if it was possible to restore the muscle-nerve unity by way of the sympathetic-parasympathetic tract. In the control animals the same severance of the tibial nerve was done without implantation of the distal stump into the sympathetic-parasympathetic tract.

The results of the procedures were decidedly different. In the animal in which no implantation of the distal stump was done there appeared changes in growth of the hair, of the claws, and of the cushions of the feet, resulting in the formation of ulcers, eruptions on the skin—all trophic disturbances. All these changes were not seen in the dogs in which the distal stump was implanted into the sympathetic-parasympathetic ganglia or tracts. Whereas the dog without implantation of the stump had a strong limping gait as a result of lowered muscular tone, the dogs in which implantation had been done showed this limping in much lesser degree or it was hardly noticeable.

In addition to this difference in muscle tone there was also a noticeable difference in the microscopic picture of the weakened muscle tissue. In the non-implanted muscles there were typical changes of muscle atrophy and muscle degeneration to a marked degree, whereas in the implanted muscles these changes were hardly noticeable or entirely absent. In the cases in which implantation was done at the site of entrance of the nerve into the muscle there were a few atrophic fibers beside many perfectly normal fibers. To what extent this relationship pertains to the nerve endings will be investigated further.

The vasomotor regulation was not investigated in these experiments as dog paws are not suitable for such a determination. With a close physiological relationship between trophic and tonic regulation it is plausible to assume that a vasomotor influence is likewise present.

By this operative procedure it seems possible to influence the trophic, tonic, and vasomotor regulation of a limb in which a nerve injury has occurred, but an improvement in the motor function has not been observed. (Koestler). Leo A. Juhnke, M.D.

SYMPATHETIC NERVES

Foerster, O.: Operative and Experimental Experiences in Man on the Influence of the Nervous System on the Circulation (Operativ-experimentelle Erfahrungen beim Menschen ueber den Einfluss des Nervensystems auf den Kreislauf). *Ztschr. f. Neur.*, 1939, 167: 439.

It is an established anatomical fact that the blood vessels are everywhere surrounded by a thick network of nerve fibers. Physiological data demonstrate the fact that the nervous system exerts a characteristic influence on the circulation. The question is, how far reaching is this influence? One cannot definitely answer the question of whether or not the necessary blood supply of a functioning organ is absolutely dependent on the neural integrity of its blood vessels. It is certain only that a limb, severed from its connection with the central nervous system, no longer reacts to those stimuli which influence the circulation reflexly, that is, stimuli effective in parts other than the paralyzed limb; yet local blood vessel reactions are produced

in such a limb by thermal, mechanical, or electrical stimuli. Thus, there are autochthonous blood-vessel reactions which in general are like the usual effects, but which have their own unmistakable characteristics. How can this be explained? The following statement has not absolutely been proved true but it seems highly probable: the overwhelming majority of the vasoconstrictor and vasodilator nerve fibers to the blood vessels pass successively from the peripheral nerves to the blood vessels primarily within the extremities. Nevertheless, a complete vasomotor interruption in all the peripheral nerve trunks of the extremities is in no way accomplished, since there is an all-important nerve plexus which passes directly (and not by the roundabout way of the gray rami communicantes and the peripheral nerves) from the sympathetic chain to the subclavian and iliac arteries. Besides, the peripheral arteries have their own intrinsic nerve plexuses and ganglion cells.

In connection with all these questions it is interesting to note Foerster's opinion that when an operatively isolated nerve is electrically stimulated it always produces only vasodilatation. And yet there is not the slightest doubt that the peripheral nerves contain numbers of sympathetic vasoconstrictor nerve fibers. Possibly our means of experimental stimulation are too crude to appreciate their action. In regard to the autochthonous local vessel reaction there is yet one fact to be kept in mind: we know that a completely de-efferented striated muscle still reacts fairly well to a direct stimulus with certain chemical stimuli, namely, the sympathicomimetics, choline and pilocarpine, especially, if they are injected directly into the blood stream. In this regard one may cite an interesting experiment of Foerster. In a patient with traumatically severed median and ulnar nerves, he freed the nerves operatively and injected 1 c.cm. of choline directly into the brachial artery. Immediately all five fingers contracted energetically to make a fist, while previously they could not move, and so firm was their contraction that they could not be straightened out by force. The clenched fist was relaxed only after the patient was given 1 mgm. of adrenalin. The smooth musculature of the blood vessels seems, therefore, to be influenced, with regard to activation of its function, more strongly than the striated muscles upon chemical stimulation. If pilocarpine is injected subcutaneously into some part of the body, in the presence of a completely severed peripheral nerve, a vasodilatation in the area of supply of the severed nerve will be found immediately. The local blood vascular system exhibits an unmistakable sensitivity to all hormonal influences after the division of a vasomotor nerve.

The sympathetic system is the main source of the vasoconstrictor fibers. Removal of the stellate ganglion frees the blood vessels of the arm of their sympathetic supply; section of the lumbar chain frees the leg. The results of these operations in angiospastic conditions are undisputed, but there arises the question as to why the results in the legs are almost always very good and long-lasting, while those in the arms are often a failure. The reason is that every sympathetic influence to the arm is interrupted by stellate ganglionectomy, while this is not true in the legs following section of the lumbar trunks. In the case of the lumbar operation usually the second and third, at most the fourth, ganglia and chain are removed, while the first and fifth lumbar, and first, second, and third sacral ganglia are preserved. In this case, also, it is a matter of preganglionic removal, and in that fact lies the fundamental difference. With ganglionectomy and postganglionic sympathectomy there arises a new hypersensitivity to adrenalin in the blood vessels and an increased vasoconstrictor reaction to local cold stimuli, all of which is entirely missing in preganglionic sympathectomy and in supranuclear diencephalic-spinal sympathetic paralysis (White; animal experiments of Ascroft and others; Foerster's own cases of human subjects). In the latter type of case it makes no difference whether the adrenal cortex hormone is given subcutaneously or otherwise, or whether it flows as the result of a fit of anger. For three years Foerster has made observations on a differential diagnostic symptom between the two types of sympathetic paralysis, that is, on adrenalin hypersensitivity of the miotic pupil in Horner's syndrome. On the grounds of these observations White recommended that the stellate ganglion not be removed, but that a preganglionic sympathectomy be done. Foerster had a puzzling result in a patient with Raynaud's disease, in whom the fingers had already reached a state of suppurative gangrene and who after operation healed in a very short time with no loss of tissue. The method is very simple: resection of the second rib and transverse process of the second thoracic vertebra. However, the pleura lies close by and must not be injured. The sympathetic nerve does not lie exactly in the paravertebral groove, as the text books state.

Foerster believes that our knowledge of the preganglionic vasoconstrictor fibers to the arms and legs is far from adequate, but that we do have sufficient knowledge of the postganglionic sympathetic supply to those parts. Those for the arm come from the middle and inferior cervical ganglion and the first and second thoracic ganglion (that is, cord segments C_5 through Th_2). The postganglionic fibers to the legs arise from the fifth lumbar and the first, second, and third sacral ganglion. It is known that the sympathetic chain ganglia receive their impulses from the lateral gray horn of the spinal cord. From these cord nuclei arise the preganglionic fibers, which then pass through the anterior roots and thence through the white rami communicantes into the corresponding ganglia of the chain. However, this lateral gray horn of the sympathetic begins in the lower portion of the eighth cervical segment and ends in the upper portion of the third lumbar segment. Thus, the sympathetic supply for the entire body is crowded together into a relatively

small space. This short spinal representation is entirely segmentally arranged for its somatic supply, as can be established by stimulation experiments. However, we do not know whether the seventh thoracic segment takes part in the vasoconstriction innervation of the arm. It is certain that section of the chain between the second and third thoracic ganglia immediately does away with vasoconstriction in the arm, without destroying a single preganglionic fiber. So far as the legs are concerned it is not entirely established whether the origin of the preganglionic vasoconstrictor fibers in the cord includes the ninth or eighth thoracic segments. It is known that section of the chain between the second and third lumbar ganglia throws out of function the great majority of the preganglionic fibers.

Eventually, Foerster applied himself to the matter of the splanchnic nerves and essential hypertension. The latest researches on these subjects are not entirely clear; they have some bearing on the matter of the origin of the splanchnics which contain predominately preganglionic fibers, but we do not know whether the spinal origin is to be found in the corresponding segmental lateral gray horns of the spinal cord. Max Peet and Kahn have had excellent results from bilateral splanchnicectomy in animals. Adson's operation with the interruption of the preganglionic fibers by resection of the lower thoracic anterior roots and upper lumbar anterior roots cannot produce the same results as Peet's, since in Adson's operation a motor paralysis of the lower abdominal musculature and a portion of the proximal thigh muscles is combined. Since the splanchnics are not only the vasoconstrictors to the abdominal viscera, but are also the controlling mechanism in the secretive action of the suprarenal glands, their removal should produce a simultaneous decrease of adrenal secretion. Foerster has not removed the thyroid in the treatment of hypertension, as Cutler has done. It seems to Foerster as very remarkable that no one has recommended hypophysectomy as treatment for high blood pressure, since so many authors represent the basophilic centers of the pituitary gland as the main source of a "high pressure hormone." At any rate the surgical treatment of hypertension is still in an infantile state.

Returning to the subject of vasomotor innervation, he emphasizes the fact that the preganglionic vasoconstrictors, which arise in the thoracic and upper lumbar cord, make their way through the anterior roots, while the vasodilator fibers have the entire spinal cord for their seat of origin and pass out through the posterior roots. If one sections a posterior root and then electrically stimulates the distal segment, a sharply circumscribed hyperemia of the corresponding skin, that is, of the corresponding dermatome, occurs quickly. One may ascribe these effects to an antidromic conduction of the sensory posterior root fibers. Foerster agrees with Gagel that efferent posterior root fibers occur in man, a subject that is widely disputed. Since nerve fibers are still present in the central segment of a sectioned posterior root from three to four years after section, their origin could be only in the spinal cord. They are not new growths, since care was taken to resect several centimeters so that a wide gap resulted between the dorsal root ganglion and the cord. The third objection, that these fibers arise from another spinal center, the fibers of which for some time rose or descended in the posterior columns and then grew into a new root location, he holds to be absurd, since in his own cases he carefully sectioned from 4 to 6 neighboring roots, completely and entirely and the afore-mentioned "wandering" of the root fibers through the spinal cord to find another root is not substantiated by his results. The cat experiments of Duncan and Krocker, in which they find an aberrant spinal ganglion in the central end of the sectioned posterior lumbar roots, must still be confirmed.

However, there are also supranuclear central vasomotor pathways which have priority over the spinal pathways. If one completely sections the spinal cord in the lower cervical or upper thoracic regions there is an immediate vasodilatation of all the body below the segmental level of the lesion. Hyperemia of the genitalia (semi-priapism) is noted especially. This procedure cuts off the supranuclear pathways of vasoconstriction which lie in the midbrain. In approximately 100 cases of section of the anterolateral spinal pathways Foerster effected a drop in pressure in many cases, and in some of these cases with hypertension the postoperative drop was even greater. It has been shown that this drop occurs only when the chordotomy interrupts the dorsal-most bundles of the anterolateral columns. On this basis the opinion seems supported that the supranuclear vasoconstrictor pathways in the spinal cord lie in these posterior-most parts of the anterolateral pathways, exactly in front of the pyramidal tracts. The anterolateral pathway sections were all in the region of the first or second thoracic segments. Foerster is undecided as to the effect of a deeper chordotomy, as practiced by some, in separating the lateral gray matter from the motor influence of the brain. He does not select bilateral chordotomy as the operation of choice in the treatment of hypertension, since he reserves this operation for the treatment of intractable pain. He has made regular observations on the vasoconstrictor reflex in the patients with chordotomy. This is located in the brain stem and is entirely linked up with the undamaged condition of the supranuclear diencephalic-spinal vasoconstrictor pathways. However, most extraordinary was the finding that even in the total division of the cord in the lower cervical region the vasoconstrictor reflex from arm to arm was lacking, but the cold reflex between them was not lacking. The descending supranuclear vasoconstrictor pathways for the arms lie concealed in the tissue which bounds the posterolateral border of the anterior horn and the pyramidal tract. If these fibers are cut in a chordotomy the reflexes com-

pletely disappear, and in that instance the drop in blood pressure is most pronounced of all. In contrast to the vasoconstrictor reflex, the vasodilator reflex is located deep within the substance of the cord (Mueller). Foerster does not discuss the complex problems of the influence upon the circulation by the brain, especially the brain stem, the visceral vagal nuclei, and the hypothalamus, nor the cortical representation of the blood vessels and the cerebral cortical influence upon them. The far-reaching dependence of the circulation upon the brain is an established fact. (Franz). John Martin, M.D.

Smithwick, R. H.: The Rationale and Technique of Sympathectomy for the Relief of Vascular Spasm of the Extremities. *New England J. Med.*, 1940, 222: 699.

The author has had a very wide experience with sympathetic surgery and is responsible for many of the perfections of this work. In this article he describes the most adequate ways of producing a complete sympathectomy in the extremities. The rationale for these procedures is explained briefly.

The procedure suggested for the upper extremity is intrathecal division of the second and third intercostal anterior and posterior roots and division of the sympathetic trunk below the third ganglion. The lower end of the sympathetic chain is tied off and the upper end is sewn into the wound. The procedure is carried out extrapleurally with removal of part of the third rib and the third transverse process.

The sympathetic nerve supply to the lower extremity is approached extraperitoneally through an incision in the loin. In men the second and third lumbar ganglia and the intervening chain are removed; in women the first, second, and third lumbar ganglia are removed.

Both these operations are attacks on the preganglionic fibers, which are necessary if recurrence of vasospasm is to be avoided.

Adrien Verbrugghen, M.D.

SURGERY OF THE THORAX

CHEST WALL AND BREAST

Hicken, N. F.: Intracystic Papilloma of the Breast. *Surgery*, 1940, 7: 724.

Papillomas may arise from any segment of the galactophorous ducts, but they are generally found in the larger lacteal sinuses adjacent to the nipple. Hyperplasia of the epithelial lining and the fibrous-tissue components of the milk ducts are both present. The epithelial cells proliferate so much faster than the connective tissue that the tumors are compelled to invaginate into the lacteal lumen. The wall of the cyst which contains the papilloma is merely that of the dilated parent duct. This duct usually contains a serous, serohemorrhagic, mucoid, purulent, or pultaceous secretion, which consists of degenerating epithelial cells, corpuscles of Gluge, leucocytes, granular débris, cholesterin scales, blood corpuscles, fat globules, bacteria, and amorphous substances. If the duct is completely obstructed by the tumor there will be a complete retention of the secretions, giving rise to the so-called intracystic papilloma.

Thickening and induration of the duct wall may be produced by deposition of fibrous tissues incident to the inflammatory or chemical irritation.

In the author's experience, papillomatous lesions are potentially malignant. Any breast which gives rise to these proliferative epithelial neoplasms is making an abnormal growth response and only time can tell what the final outcome will be.

In one instance serous cysts, mazoplastic changes, a fibro-adenoma, a papilloma, intraductal epithelial hyperplasia, and a papillary adenocarcinoma were all found within the same breast.

In a series of 18 cases this author encountered 2 which exhibited both benign and malignant intracystic papillomas in the same breast.

Intracystic papillomas are a disease of early middle life. They occur in both sexes, but are much more common in women. In the literature there are revealed only 3 instances in which papillomas were present during pregnancy or lactation. They seem to appear during the resting phase rather than while the breast is actively functioning. These neoplasms usually grow slowly. In some cases they have been observed for more than thirty years without any appreciable change. In this author's series, the average time elapsing before medical advice was obtained was four and one-half months.

Hemorrhagic or serosanguineous discharge is the most frequent symptom of intracystic papilloma. This discharge may occur weekly or monthly, or even at yearly intervals, or it may be continuous.

Not every bleeding papilloma produces a discharge from the nipple; therefore it is extremely important to study the nipple and all escaping secretions. In one of the author's cases cancer cells were detected in the escaping discharge. A bloody discharge does not necessarily mean a duct papilloma, for it can occur with any condition which produces erosion of the ductal epithelium. A girl, nineteen years old, in the eighth month of pregnancy had a bloody discharge from both breasts. No infection was found; no abnormalities in size, shape, or conformation of the milk ducts could be demonstrated. As soon as lactation began, the bleeding stopped spontaneously. An excessive vascularity incident to the functional hyperplasia of the lactiferous ducts was responsible.

Pain is seldom present with a papilloma. Detection by palpation may be most difficult. The tumor is often small in size, and composed of soft, compressible tissues. Ninety-five per cent of the papillomas are situated within or directly beneath the nipple in the subareolar zone. Manipulation of the tumor exerts traction on the parent duct and hence retracts the nipple in the same direction as the applied force. If located within the nipple or immediately beneath it, the expanding growth may push the nipple outward. Transillumination studies are frequently valuable in the larger papillomas.

Diagnosis can be made by accurate roentgenographic patterns of these intraductal tumors by the introduction of contrast substances into the diseased lacteals.

In the author's earlier studies various radiopaque substances, such as lipiodine, hippuran diodrast, and thorotrast were used. Thorotrast was found to produce granulomatous lesions, and therefore it was discontinued.

It has been found that skiodan viscous is a suitable substance. It is an aqueous solution of iodides, but a rapid diffusion is prevented by holding the soluble iodides in a suspension of viscous gum acacia. Skiodan viscous remains within the lactiferous tubules from three to ten minutes, a sufficient time to permit accurate roentgenograms to be taken before it is absorbed. Thirty minutes after the ductal injections are made no skiodan viscous can be found within the ducts.

Fifty diagnostic mammograms using skiodan viscous have been made in virginal, lactating, resting, and diseased breasts without any untoward complications.

Five actively functioning breasts have been injected without diminishing the flow of milk or interfering with the regular periods of nursing.

J. Daniel Willems, M.D.

Trout, H. H.: The Rôle of Irradiation in the Treatment of Carcinoma of the Breast. *Ann. Surg.*, 1940, 111: 700.

The author prefaces his paper with the statement that he does not believe there is at present any substitute for the radical operation in the treatment of

carcinoma of the breast. While much harm can be done by an improperly executed operation, even more harm can come from improper irradiation.

The views as expressed by the author are based on his study of the literature, discussions with medical colleagues, and an intimate and close study of 600 cases of carcinoma of the breast observed for over a quarter of a century. He believes that any form or frequency of irradiation that produces necrosis of the skin is harmful. A trial dose of irradiation should be employed whenever possible to obtain some idea of the patient's skin response to irradiation.

It is the author's opinion that breast cancers in younger women are more radiosensitive than those found in older women. This is because more carcinomas of Grades 3 and 4 are found in this age group. The addition of irradiation has improved the prognosis in this younger age group more than it has in the older age group. Better results are obtained in the younger group from irradiation at shorter intervals than seems advisable or necessary for older women. Also, more inoperable carcinoma of the breast has been found in young women than in women past the menopause.

The general plan as employed by the author is to irradiate pre-operatively, to place many small tubes of radium around the entire operative field and under the skin at the time of operation, and to follow this with postoperative irradiation. It is not always possible to employ all three types of irradiation.

Pre-operative irradiation is indicated especially in the following cases: (1) for patients having palpable nodes in the axilla, (2) when the malignancy is fixed to the skin or underlying muscle, (3) when it is hoped to operate under local anesthesia because of the physical condition of the patient, (4) in rapidly growing malignancy, especially if associated with infection, (5) in malignancy of the breast associated with pregnancy, (6) in some inoperable case that may be made operable, and (7) for the implantation of a carcinoma in the tract of an aspiration biopsy needle.

The amount of skin excised is becoming larger so that it is more frequently necessary to use skin grafts. Postoperative irradiation is begun ten days following operation. This method also applies to those cases having skin grafts.

From 1901 to 1920 there were 152 cases in which only the radical operation was performed. In this group there were 10 local recurrences and the 3 or more years' cures amounted to 22 per cent. From 1920 to 1924 there were 80 cases in which radium implantation under the skin was used with the radical operation. In this group there were 4 local recurrences, and three or more years' cures occurred in 30 per cent. From 1924 to 1939 there were 211 cases in which radium was inserted at the time of radical mastectomy and postoperative irradiation was done with 8 local recurrences and three or more years cures in 55 per cent. Also from 1924 to 1939 there were 126 cases treated by pre-operative and postoperative irradiation and radium was inserted at the time of operation. In this group there were no local recurrences, and three or more years' cures occurred in 55 per cent.

The author has also used irradiation of the ovaries in patients with carcinoma of the breast. He believes it is indicated in patients in whom the tumor is rapidly growing, if there is an associated infection, if pregnancy is present, when the tumor is fixed to the skin or underlying muscle, in cases of recurrence, and in patients with inoperable carcinoma of the breast.

EARL O. LATIMER, M.D.

TRACHEA, LUNGS, AND PLEURA

Hutson, A. M.: Thoracoplasty in Pulmonary Tuberculosis: A General Survey of 47 Cases. *Australian & New Zealand J. Surg.*, 1940, 9: 359.

Hutson reviews the evolution of the operation of thoracoplasty for the treatment of pulmonary tuberculosis. He clearly outlines the indications and contraindications for the operation and presents the results in 47 patients who were operated upon at the Austin Hospital. A total of 115 operations were done. Seven patients died, a mortality rate of 6 per cent per operation and 15 per cent per patient. Six patients died of the tuberculosis at varying periods up to two years after the operation.

Thirty-four patients are still living. Twenty-four, or 70 per cent, have negative sputum and are apparently cured. Of the 34, 18 are working. Ten other patients show definite improvement in their conditions, but have positive sputum.

JULIAN A. MOORE, M.D.

Hudson, W. A.: A Selective Type of Thoracoplastic Operation. *J. Thoracic Surg.*, 1940, 9: 357.

Hudson describes a modification in the technique of thoracoplasty combined with an apicolysis in the treatment of pulmonary tuberculosis.

The usual technique is to remove three ribs as far forward as the costal cartilages through a posterior incision. If an apicolysis is added to this procedure, the entire apex of the pleura is stripped from its fascial attachments and the apex of the lung is pushed down.

Hudson removes the whole of the first and second costal cartilages and ribs through an anterior incision and separates the pleura from all fascial attachments except at its extreme apex. This prevents the apex of the lung from dropping into the midportion of the chest. At the second stage, a shorter than usual posterior incision is made, through which the third and fourth ribs are removed in long lengths. Any remaining stump of the second rib and the transverse processes of the second, third, and fourth vertebræ are removed. At this stage the pleura is further stripped away from its fascial attachments. Subsequent removal of more ribs through a posterior incision is done if necessary. Pressure pads are applied in front and in the axilla, and these are worn for at least three months.

In Hudson's experience, this technique has been very satisfactory.

JULIAN A. MOORE, M.D.

O'Brien, E. J., Day, J. C., Chapman, P. T., and Tuttle, W. M.: A Study of the Immediate and Late Results in 511 Patients Subjected to Thoracoplasty. *J. Thoracic Surg.*, 1940, 9: 364.

O'Brien and his coworkers report their experience in the cases of 511 patients who were subjected to 1,404 thoracoplastic operations.

The immediate mortality rate (patients dying within eight weeks) was 9.39 per cent, the late mortality rate 9.78 per cent.

Cavity closure was effected in 87.02 per cent of the patients, and sputum conversion in 81.65 per cent.

One hundred and eighty-seven patients are apparently cured; the condition has been arrested in 82, and apparently arrested in 40; it is quiescent in 26, and unstable in 49. Twenty-six patients could not be traced.

Of 296 patients at home, 224 are working and able to work.

In addition to the above statistics, O'Brien calls attention to many practical experiences which have led to improvement in the selection and management of the patients. A most important practice is the routine bronchoscopic examination of all patients before they are subjected to thoracoplasty. Nearly 10 per cent were found to have tuberculous tracheobronchitis. This knowledge is essential before subjecting patients to thoracoplasty.

In their experience, bronchoscopic aspiration of retained secretions after operation contributed to lowering the mortality rate and has saved the lives of quite a few patients.

The authors are very liberal in accepting patients for thoracoplasty. Many patients receiving pneumothorax on the contralateral side were accepted for thoracoplasty. The authors believe that the mortality rate could be lowered and the end-results improved if they accepted only good risks. However, they think it the surgeon's duty to rescue as many patients as possible, and do not hesitate to operate on many bad risk patients as long as there is a reasonable chance of arresting the disease.

JULIAN A. MOORE, M.D.

Fruchaud, H., and Bernou, A.: Late Results of Thoracoplasty in Pulmonary Tuberculosis (Résultats éloignés de thoracoplasties dans la tuberculose pulmonaire). *Mém. l'Acad. de chir.*, Par., 1940, 66: 245.

Fruchaud and Bernou report their results in 242 cases of pulmonary tuberculosis in which thoracoplasty was done by their special technique, the essential feature of which is that the first rib is not resected until the second stage of the operation. At the first stage of the operation the fifth or sixth to the second ribs are resected. The resections in this stage are not extensive; if the sixth rib is resected, not more than 4 cm. are removed; a larger portion of the upper ribs is removed, but the resection is almost complete only for the second rib, of which only from 2 to 3 cm. are left. In the second-stage operation, another of the lower ribs may be resected, i.e., the sixth if this was not resected at the first stage, but this is not always done. The resections of the other ribs are enlarged, and the second rib is completely removed to the cartilage. The first rib is then removed completely, often with a part of its cartilage. If a third-stage operation proves necessary, the seventh rib, or perhaps the seventh and eighth ribs, are partially resected, rarely the ninth rib; the resection of the upper ribs is enlarged, with complete removal of the third rib to the cartilage.

These operations are well supported by patients, even those in poor general condition, and those who are febrile with active progressive lesions. There is almost never any surgical shock, and rarely a death in the first three weeks following operation. With this technique the collapse of the lung occurs more gradually but is more complete than with the usual method of thoracoplasty. Strict asepsis must be maintained in the operative field after the first-stage operation.

Among the 242 cases operated upon by this method (532 operations), there were 174 cures, 35 cases with partial improvement, and 33 deaths. Only 9 of the deaths occurred in the first three weeks after operation, the others at a later period. These 33 deaths included those cases in which a second-stage operation could not be done. Thus with this type of thoracoplasty cures were obtained in 71.31 per cent and there was some improvement in an additional 14.34 per cent of the cases. The results were best in those cases in which the indications for thoracoplasty were definite and the cases were of the type considered most favorable for operation; in this group there were 148 cases, with cures in 127 (85.81 per cent). An additional 19 patients (13.51 per cent) showed improvement in their conditions. There were only 2 deaths in this group; one of these occurred postoperatively in a patient who showed toxemia from treatment with gold salts. In 35 cases the indications for thoracoplasty were less definite (very large cavities or non-progressive bilateral lesions); many surgeons hesitate to operate in such cases. In this group, there were 27 cures, (77.14 per cent), 6 cases with partial improvement, and 2 deaths. In 59 cases the indications for operation were doubtful; in most of these the lesions were progressive and some surgeons would have considered them inoperable. The percentage of deaths was high in this group, 49.16 per cent (29 deaths), but most of these deaths did not occur until late, from the natural progress of the disease. However, 20 of the patients in this group (33.89 per cent) were cured, and another 16.94 per cent (10 patients) showed improvement in their condition.

These results, the authors find, are superior to those reported with the usual type of thoracoplasty and compare favorably with those reported for the Semb operation (thoracoplasty with apicolysis). The operation described, they claim, is safer and less likely to cause shock than the operation with apicolysis in the first stage. If apicolysis proves to

be necessary, as indicated by the results of the first-stage operation, it can be done at the second stage of their operation. ALICE M. MEYERS.

Collis, J. L., and Foster-Carter, A. F.: Spontaneous Pneumothorax and Staphylococcal Lung Abscess in an Infant. *Lancet*, 1940, 238: 875.

A detailed record of this case of pneumothorax and lung abscess is presented because it contained an intricate problem of diagnosis.

The infant was male, aged eight weeks. It had been well until ten days previously, when it developed a paroxysmal cough. During the attacks of coughing it became blue and breathless. Roentgenography showed an air-containing space occupying the greater part of the left chest. The mediastinum was displaced to the right. A needle was inserted into the left side of the chest and air escaped under pressure. There was hyperresonance with absence of breathing sounds over the left chest. Further roentgenography showed that the collection of air did not reach the left apex. The lateral view suggested that coils of the intestine were present in the left pleural cavity. The condition was thought to be a large pulmonary cyst rather than a pneumothorax.

At operation a cystic space was found. The lung was collapsed. A bead of pus was seen escaping from a small abscess cavity in the lung where the lower lobe joined the chest wall. There was no fluid in the pleural cavity. The baby died on the following day.

At necropsy it was found that the upper lobe was aerated, whereas the lower lobe was collapsed and hemorrhagic and contained multiple whitish areas. In one of these there was a small abscess cavity which had ruptured through the pleura. Cultures from the pus and from the lung yielded a pure growth of staphylococcus aureus.

J. DANIEL WILLEMS, M.D.

Vivoli, D.: Cancer of the Lung and Specific Inflammatory Processes (Cáncer del pulmón y procesos inflamatorios específicos). *An. de la cátedra de patol. y clin. de la tuberculosis*, 1939, No. 2, p. 267.

The coexistence of bronchopulmonary cancer and specific inflammatory processes, such as tuberculosis, syphilis, and actinomycosis, has been the subject of many serious discussions. The first observation of cancer with pulmonary tuberculosis was reported by Bayle in 1810, but any attempt to associate them was denounced by Rokitansky a few years later.

Pearl reported in 1929 that in a series of 6,670 necropsies, it was observed that half of the cases of pulmonary cancer presented tuberculous cicatrices, while only 6.6 per cent of the total number had forms of developmental tuberculosis. Pearl stated that the ratio of the developmental form associated with cancer to the cicatricial form was 1 to 2. Carlson and Bell, in reporting 11,195 autopsies, came to the same conclusion.

Observations of cancer originating in the wall of a cavity have been made by many investigators, including Ayet and Naussac, Basch, Bernard, Breckwoldt, and Schwalbe. Tuttle and Womack do not believe in the development of cancer in the wall of a cavity, for these authors, in all of their published observations, state that all of the cancers are primary bronchiogenic lesions with secondary bronchiectasia. The author disagrees with this point of view and believes that their Case 2 is an authentic one of malignant degeneration of the wall of a tuberculous cavity in which the tumor had its origin in the bronchus proximal to the area and later invaded the wall and grew into the lumen.

Experimental work has shed very little light on the problem. The development of a cutaneous cancer over an old lupus cicatrix is proved, but it has not been demonstrated that pulmonary tuberculosis is capable of favoring the growth of cancer in the lung. Moise has called attention to epithelial metaplasia in all of these cases of acute or chronic inflammatory processes and has noted sclerosis as a sequel. Menetrier and Ribbert believed that these sclerotic nuclei played an active part in the genesis of the tumors.

Winternitz, Smith, and McNamara found that the regenerative picture of bronchial mucosa in rabbits, following destruction with hydrochloric acid, often resembled the chronic inflammatory process in man and sometimes resembled malignant epithelial tumors. Haythorn noted that the metaplastic transformation of bronchial mucosa into stratified pavement epithelium, which may be observed in chronic inflammation in man, is always accompanied by alterations in the basement membrane.

Eddy, Schmidt, McCullough, and Dalldorf have produced metaplasia of the bronchial mucosa in rats with a diet poor in Vitamin A and injections of large doses of theelin, of such magnitude as to occlude the lumen.

Wolf believes that bronchiogenic tumors often originate from cicatricial lesions of the mucosa secondary to the eruption of tuberculous lymphatic nodes, and gives this as the reason for their usual hilar location.

Tuttle and Womack do not believe in the malignant transformation of the metaplastic epithelium. Among 76 cases of bronchiectasis studied, a bronchiogenic cancer was observed in only 1 instance. These authors consider the metaplasia observed in the inflammatory processes as a medium of protection of the tissues against a microbial attack, and not a precancerous state. Experimentally, Teuschlander has demonstrated that the Koch bacillus possesses the power of immunization against the sarcoma of fowls.

Among a total of 86 cases of bronchopulmonary cancer, the author observed the simultaneous existence of tuberculous changes in 8 cases, the association with pulmonary syphilis in 7, and the association with actinomycosis in 1.

In résumé, the author states that he believes that the tuberculosis usually precedes the cancer in these associated cases and in no way inhibits the develop-

ment of the latter. The cachexia neoplastica could awaken inactive tuberculous lesions: He could not consider the tuberculosis of etiological significance except in a very small number of cases, and then more as a chronic, irritative, metaplastic process than as a true etiological agent.

FRANK MCDOWELL, M.D.

Hammond, A. E.: The Diagnosis and Treatment of Carcinoma of the Lung, with a Statistical Review of 40 Cases. *Arch. Otolaryngol.*, 1940, 31: 780.

From the review of 40 cases of carcinoma of the lung, the following conclusions concerning the various factors are drawn by the author:

1. Sex incidence. The ratio, 4 men to 1 woman, is a finding which coincides with that of other investigators. The higher rate in the male sex is explained on the basis of excessive use of tobacco, the tar from the combustion acting as a carcinogenic element. Other irritative elements, such as chemical, mechanical, bacterial, thermal, and radio-active agents, may also contribute.

2. Age incidence. The highest age incidence was between forty and sixty years, representing 72.5 per cent of the series.

3. Symptomatology. It was found that in order of their frequency the most important clinical symptoms were cough, pain, loss of weight, hemoptysis, dyspnea, and hoarseness, the cough occurring in 100 per cent and the hoarseness in 10 per cent of the cases, with the remaining symptoms occupying positions between the two.

4. Diagnostic procedures. The physical signs appeared of vague topographic value in a restricted number of cases. The roentgen findings, on the other hand, although not infrequently permitting a more precise morphological estimation of the process, especially of the secondary complications, gave rise to deductions which often made an exact differentiation from other intrathoracic lesions difficult, if not impossible. Thus, bronchoscopic study, by force of circumstances, remained the sole and indisputable diagnostic procedure in nearly all of the cases.

5. Pathology. The pathological survey clearly showed that the grading of the tumors according to malignancy index appeared of little value as far as the estimation of the final outcome in the individual cases was concerned.

6. Therapeutic procedures. These included surgical intervention in 6 cases and irradiation therapy in 26 cases, the latter method of treatment being given either in the form of a combination of roentgen therapy and intrabronchially applied radium (11 cases) or in the form of roentgen therapy alone (15 cases). None of the patients treated by surgical procedure survived the nine-month period. Of the patients treated by irradiation, 4 apparently have been cured, and for others some prolongation of life with more or less satisfactory palliation was obtained. The conditions of all of the patients who were apparently cured were in the early stage, and the good results were brought about by the combination of roentgen irradiation administered externally and intrabronchially applied radium.

JOSEPH K. NARAT, M.D.

Zschau, H.: The Applicability of Pedunculated Muscle Flaps in the Operation for Residual Empyemas and Indirect Bronchial Fistulas (Ueber die Verwendbarkeit gestielter Muskellapen bei der Operation von Restempyemen und indirekten Bronchialfisteln). *Zentralbl. f. Chir.*, 1939, p. 2529.

Zschau reports the operative results in 3 patients on whom pedunculated muscle flaps were used in the treatment of residual empyemas and indirect bronchial fistulas. In the first case, there was a fistulous residual cavity following a suppurative hematoma in the anterior region of the fifth rib. Because the removal of the ribs coursing over the fistula would have become too extensive, a small muscle flap formed at the same time was inserted into the fistulous tract—a broadly pedunculated flap which was used for filling of the residual empyema cavity. The clinical result was very good and the patient became fully capacitated for work.

In the 2 other patients there were indirect bronchial fistulas and residual empyemas. Contrary to the rule of first transforming the indirect into direct fistulas by thoracoplasty and of carrying out the excision of the fistula at a second sitting, both patients were operated upon at only one sitting. The muscular flaps were taken as large and broad as possible. Both patients were cured in a few weeks.

These procedures are recommended on the basis of the experiences encountered.

(WELCKER). LOUIS NEUWELT, M.D.

Castelo Branco, J. M.: A Clinical Study of Cerebral Gaseous Embolism in Thoracopulmonary Surgery (Estudo clinico das embolias gazosas cerebrais em cirurgia toraco-pulmonar). *Folha med.*, 1940, 21: 74, 90.

Castelo Branco states that syncope, convulsions, and, finally, paralysis are caused by cerebral gas embolism; the complete cycle is rarely seen but often the first or second stages are observed. At times without prodromal signs, at times with preceding amaurosis, formications, nausea, or a vague sensation of ill-being, the symptoms appear suddenly, and pallor, apnea, mydriasis, rigidity, and loss of consciousness occur simultaneously. These symptoms, which last a few seconds, may disappear without leaving any sequelæ, may change into others, or may end in the death of the patient. They are followed by cyanosis, contractions of the jaws, spasmodic trismus, tonic and clonic convulsions, lamentations, and finally generalized spasms. These crises may return at varying intervals and disappear without sequelæ or end in paralysis or death, especially in cases of subintrant crises. Consequently, the nervous accidents resulting from the entrance of air into the veins of the small circulation present a decided epileptoid character and a picture of varying

gravity and duration; the symptoms may last hours and even days, but death does not depend on their greater duration. In fact, death may occur suddenly without the described sequence of symptoms; on the other hand, patients with subintrant crises, who have been unconscious for hours and days, may gradually improve, regain consciousness, and return to normal, and finally show no sequelæ or only minimal sequelæ which usually consist of paralysis or paresis limited mostly to the upper extremities. The author describes several cases illustrating the various possibilities which he has discussed. He attributes the sudden death of one of his patients to massive bulbar embolism. He disagrees with various authors who have observed isolated phenomena and clinical signs to which they attach decided importance for the diagnosis or the characterization of the nervous syndrome of cerebral gas embolism; these signs and phenomena have little value as diagnostic elements and are only indications of predominant localizations of the embolus and of the ischemic territories in individual cases. In this connection, he mentions mental confusion after the cerebral embolic accident (Brunnerie), sardonic grin (Leuret and Caussimon), hemilateral or triangular anemia of the tongue (Liebermeister), and cyanotic spots on the skin (Brauer), symptoms which he has never, or only exceptionally, observed.

A review of the literature on the nervous accidents of collapse therapy of pulmonary tuberculosis and of thoracic surgery in general reveals the confusion and the unreliability of the therapeutic measures which are recommended. The same insecurity and even lack of logic characterize the prophylactic measures preconized for these accidents. Consideration of the pathological mechanism of the accidents shows that only those techniques should be used which protect the patient against risks; and, therefore, thoracic or pulmonary punctures, whether for diagnostic or therapeutic purposes, should always be done with a sharp needle provided with a mandrel, so that no vein which might be accidentally entered can come in contact with air. In gaseous collapse therapy, various conditions must receive consideration because they permit greater possibilities for the production of cerebral embolism. A rigorous technique is always indicated. The great majority of the accidents are caused by puncture of a pulmonary vein or of vascularized pleuropulmonary adhesions. Therefore, adhesions should first be sectioned by the method of Jacobeus or by means of an open operation, and, if this is impossible, the puncture should be made away from the adhesions, or the pneumothorax as well as the partial pneumothorax with positive pressure should be abandoned and the tendency toward adhesion avoided.

In the treatment of cerebral accidents, most of the measures that have been recommended are either useless or dangerous. The administration of heart tonics and kinetic drugs, the treatment of symptoms, especially of the convulsive crises, artificial respiration and even heroic measures to combat respiratory syncope, and the use of bulbar stimulants, such as coramine and lobeline, may be useful according to the nature of the cases. Subcutaneous and intracardiac injections of adrenaline are contraindicated and dangerous. Lately, the injection of vasodilating substances has been recommended: acetylcholine gave favorable results in one of the author's cases, while 0.00025 gm. of ergotamine tartrate, administered intramuscularly, had a prompt effect in another case. However, the latter should not be used in cases of surgical shock, which it aggravates.

RICHARD KEMEL, M.D.

ESOPHAGUS AND MEDIASTINUM

Juzbašić, D. M.: Bases for the Surgical Treatment of Esophageal Varices (Die Grundlagen fuer die chirurgische Behandlung der Oesophagusvaricen). *Deutsche Ztschr. f. Chir.*, 1939, 252: 711.

The author reviews in detail the development and the present status of the question of esophageal varices. The history of the question is described analytically and interestingly. The normal and pathological anatomy is then discussed, and the causes and symptoms of these varices.

In the author's opinion, various treatments are indicated, depending upon the cause and extent of the involvement. The purpose of operation is to interrupt the blood flow from the portal vein into the vena cava, by way of the esophagus, and to establish a new and safe communication in place of the obstructed collateral circulation.

On the basis of experiments consisting essentially of the injection of dyes into the mesenteric veins before and after obstruction of the return flow, the author recommends the following operative procedure: (1) interruption of all afferent venous trunks in the lesser mesentery, (2) interruption of the venous afferent trunks in the region of the spleen, and (3) establishment of a new collateral pathway for portal vein blood to the vena cava by means of a modification of the Talma operation. For this purpose, the greater omentum is sewed into the peritoneal suture line or into the rectus sheath. The author believes that the Talma operation will then offer much greater promise of success, since the return pathways through the varices have been interrupted.

(VOGELER). LEO M. ZIMMERMAN, M.D.

Wookey, H.: Surgical Treatment of Mid-Esophageal Carcinoma. *Brit. J. Surg.*, 1940, 27: 696.

The results of the radiological treatment of esophageal carcinoma have proved disappointing and a new interest in the possibility of the surgical excision of such tumors has arisen. The high operative mortality in the surgical removal of the esophagus has led to the general adoption of palliative measures, but many unfortunate patients would readily agree to a radical operation if there were a fair chance of survival. Carcinoma of the esophagus is relatively slow in its growth and the spread to the regional lymph glands occurs late in the disease.

The present article deals only with the mid-esophageal growths. They are usually situated at about the level of the left bronchus and partly behind the arch of the aorta.

The conventional method of approach for removal of the esophagus has been through the left side of the chest, but the author has found that approach from the right side possesses many advantages and renders the operation much simpler. The article is based on 4 cases in which the thoracic esophagus was removed. In the first case the usual approach through the left side of the chest was employed, but in the last 3 the exposure was through the right side of the chest. It was found in operations on the cadaver that by the division of the vena azygos major close to its junction with the superior vena cava, the right lung together with other mediastinal structures could be readily displaced forward and to the left. The esophagus could then be completely exposed and most of the technical difficulties eliminated.

The Janeway tube gastrostomy was used in 3 cases and a simple jejunostomy in the fourth case. The patient is allowed to recover from this operation and to become accustomed to tube feeding. The general condition of the patient is improved by blood transfusions. Three weeks later the second stage is done and consists of the exposure of the upper end of the esophagus in the left side of the neck. The upper 2 in. are mobilized and a loop of silver wire passed loosely around the esophagus, the twisted ends being brought through the anterior margin of the sternomastoid muscle. The neck wound is closed without drainage. Five days later the third operation is done under intratracheal anesthesia—gas and oxygen or cyclopropane. The patient lies on his left side with his chest supported by a sandbag. His arm is drawn forward and upward and secured to an armrest. A continuous drip transfusion is given throughout the operation. A long incision is made over the seventh interspace just below the angle of the scapula. The seventh and eighth ribs are divided as far back as possible and the pleura is opened along the line of incision. Heavy self-retaining retractors are used to spread the ribs, which affords ample space for the further steps of the operation. Any pleuritic adhesions are divided, and with the collapse of the lung the vena azygos major is easily seen as it turns forward to enter the superior vena cava. The vena azygos major is divided between ligatures. The right lung together with the mediastinal contents is now displaced forward and to the left. A long incision is made through the mediastinal pleura along the right margin of the esophagus. This incision is carried down to the diaphragm. The esophagus is now freely exposed, together with the tumor, and one may quickly decide whether removal is possible.

The esophagus is freed above and below the tumor mass, tapes being passed around it, above and below. By blunt dissection the tumor is completely freed from the surrounding structures, great care

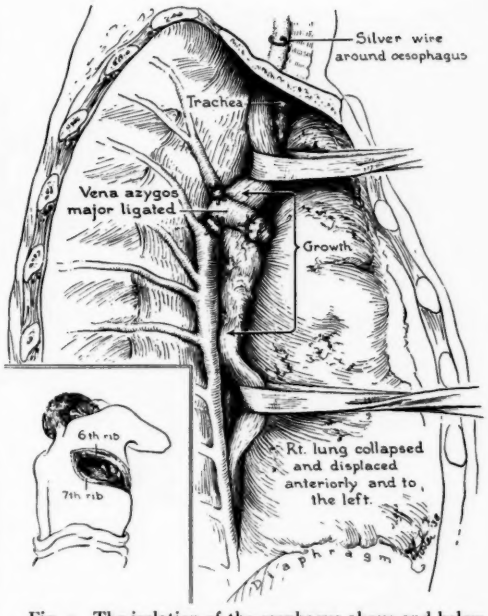

Fig. 1. The isolation of the esophagus above and below the growth. Inset shows method of approach.

being used to protect the left bronchus and pleura. Should the left pleura be opened, the opening is closed at once. After complete separation of the tumor from the surrounding structures, the esophagus in the upper part of the thorax is easily freed by blunt dissection and the loop of silver wire is felt. This may all be done without seeing the aorta or any of the great vessels and is very much simpler than the same procedure from the left side of the chest.

The esophagus is now divided as low down as possible by cautery and the lower end is ligated, invaginated, and allowed to slip beneath the pleura. The upper end of the esophagus is ligated and a finger stall is drawn over it and secured by ligatures to prevent contamination. The opening in the mediastinal pleura is now closed and the chest wound is closed by interrupted sutures passing around the ribs. The chest is drained by closed drainage introduced through a stab wound in the tenth interspace in the mid-axillary line. The patient is now turned on his back, the neck wound is opened, the silver wire is quickly identified, and the esophagus is brought out through the opening in the neck.

Following the removal of the thoracic esophagus a patient may live indefinitely with a gastrostomy. In some cases the upper end of the esophagus may be connected to the lower opening by a rubber tube. In others a reconstruction of the esophagus can be done with a skin tube. JOSEPH K. NARAT, M.D.

MISCELLANEOUS

Jones, J. C., Dolley, F. S. and Bullock, L. T.: The Diagnosis and Surgical Therapy of Patent Ductus Arteriosus. *J. Thoracic Surg.*, 1940, 9: 413.

This report covers 7 cases of ductus arteriosus operated on by the authors. The ages of the patients ranged from four to thirty-one years. Three were males, 4 females. Six were born at term, 1 at seven and one-half months. Development during infancy was normal. Six had the common diseases of childhood, but none had rheumatic fever or chorea. One patient had undescended testicles and webbing of the toes. One had a spastic paralysis of the arms from a birth injury. One had had a lung abscess eighteen years previously. There was no family history of congenital defects or heart disease.

There were no symptoms of cyanosis, congestive heart failure, or edema. All patients were comfortable at rest, but complained of weakness, ease of fatigue, and dyspnea on exertion. One patient had a fainting attack a week before admission, and 1 had attacks of frequent tachycardia and dyspnea. Pallor was not striking in any patient, and none had clubbing. All except 1 adult showed a high pulse pressure with a low diastolic pressure. The diastolic pressure was often difficult to measure exactly. One patient had a classical Corrigan pulse and pistol-shot sound over the femoral artery. In all of the patients exercise caused a marked increase in the pulse pressure with a drop in the diastolic pressure, often to zero. In every case the blood pressure was higher in the leg than in the arm. A precordial heave was seen in 3 patients, and a thrill was present in 6. The first sound at the apex was uniformly normal. In 4 patients the pulmonic second sound was increased, and in the others it could not be distinguished from the murmur. There was a continuous murmur in the pulmonic area in all. Enlargement of the heart was demonstrated by the roentgenogram in 6 patients. The electrocardiograms showed no axis deviation, except in 1 case, which exhibited a slight right axis deviation. The Q wave in lead III was prominent in 5 cases; the R wave was notched in lead I in 2. The S-T interval was slightly depressed in leads II and III in 3 cases, and the T wave in lead I was inverted in 1 case.

Operation was done under cyclopropane and oxygen anesthesia administered through an intratracheal tube. Two different incisions were employed. In the males a linear incision was made along the second intercostal space from the parasternal to the anterior axillary lines. In the females an inframammary incision beginning at the third costal cartilage and circling beneath the breast and upward to the mid-axilla at about the fourth rib was utilized for cosmetic reasons. The second and third cartilages were excised. The intercostal vessels were doubly ligated and divided. The collapse of the lung exposed a prominent pulmonary conus. The mediastinal pleura was incised 1 cm. behind the left phrenic nerve and 1 or 2 cm. below the arch of the aorta. The mediastinal pleura, along with the phrenic nerve, was retracted forward and downward. The ductus was then dissected and a blunt aneurysm passed around it, threaded with two silk sutures. These ligatures were temporarily tightened until the pulse pressure was recorded. When no untoward signs appeared they were permanently tied.

All patients were in good postoperative condition. Recovery was smooth and without discomfort.

One patient, a girl aged thirteen years, had normal convalescence and was discharged on the fourteenth day in good condition. She returned to her normal activities and was apparently well until thirty days after the operation. She then suddenly developed a fever of 105 degrees and a pain between the scapulæ. Three days later a humming continuous murmur in the pulmonic area was found. Blood cultures showed the hemolytic staphylococcus aureus. Post-mortem examination showed the heart to be definitely enlarged with both ventricles hypertrophied. The valves were normal. Between the aorta and the pulmonary artery in the position of the ductus arteriosus was a rounded mass 3 cm. in diameter, bulging toward the sternum, and, posteriorly, a mass 1 cm. in diameter protruded toward the spine. There was a dimple in the aorta at the opening of the ductus; this was 0.6 cm. in diameter and 0.3 cm. deep, and was filled with a thrombus, the surface of which was flush with the intima of the aorta. Another thrombus extended from the ductus into the lumen of the pulmonary artery. This orifice was surrounded by friable, gray, wary vegetations which were adherent to the intimal surface and seemed to split away and elevate the inner layer of the wall. The wall of the ductus was intact for a distance of 0.3 cm. from the aorta but gave way abruptly and thus formed an aneurysm. This lesion involved sloughing of the wall of the ductus and reëstablishment of the connection between the aorta and pulmonary artery by a blood channel.

J. Daniel Willems, M.D.

SURGERY OF THE ABDOMEN

ABDOMINAL WALL AND PERITONEUM

Wakeley, C. P. G.: The Treatment of Certain Types of External Hernias. *Lancet*, 1940, 238: 822.

The author studied the subsequent histories of 2,020 patients on whom he had operated for hernia during the period from 1915 to 1939.

The cases were distributed as follows:

	No. of Cases
Inguinal hernia	1,232
Sliding hernia of the sigmoid	15
Sliding hernia of the cecum	5
Femoral hernia	610
Umbilical hernia	155
Obturator hernia	2
Sciatic hernia	1
Total	2,020

Most cases of indirect inguinal hernia are congenital, only a few being of true traumatic origin. Inguinal hernia is found in three distinct age groups: infants, young adults, and elderly people. In infants inguinal hernia can be cured in some cases with an improvised truss, but in many cases thought to have been cured in infancy, hernia recurs as the patient reaches manhood, when an operation has to be performed. Such cases are not recurrences at all, because the hernial sac has been present all the time and has never been obliterated. The best treatment, therefore, for inguinal hernia in infants is operation. This is simple and requires no reconstruction of the inguinal canal.

In young adults inguinal hernia is congenital and indirect. Trusses and appliances can never cure the condition and only make the hernia larger, because the continued pressure brings about compression atrophy of the abdominal muscles. Operation is the treatment of choice. Whatever the particular operative procedure preferred by the surgeon, it must restore the structures in the inguinal canal as closely as possible to their normal condition. If recurrence is to be prevented, small direct hernias which are so often present must be searched for and treated at the time of operation. In studying a series of recurrent inguinal hernias, the one fact which becomes obvious is that most of the recurrent hernias are direct, although the first operation was performed for an indirect inguinal hernia. The author does not favor the use of fascial grafts for the repair of inguinal hernia and he believes that the results obtained by ordinary operation are uniformly good if convalescence is properly carried out. The patient should remain in bed for at least two weeks after operation, should have a month's convalescence, and should not do any hard work for at least six months.

Nearly all recurrences are seen in the first two years after operation. Table I shows the recurrence rate found as the result of an extensive follow-up of cases of primary and recurrent hernia.

TABLE I.—RECURRENCE IN PRIMARY AND RECURRENT HERNIAS

Type	Total No. of Cases	Cases Traced	No. of Recurrences	Percentage of Recurrence
Primary	1,140	851	46	5.4
Recurrent	92	59	23	38.6

The author recommends the use of silk suture material.

The results of operation in direct inguinal hernia are not nearly so satisfactory as those obtained in the indirect type, and the recurrence rate is higher. It is important, when operating upon a direct inguinal hernia, to remember that such a hernia consists of a bulging of the posterior wall of the inguinal canal, and any operation for its cure must consolidate the posterior wall and re-form the internal and external abdominal rings. The author refutes the use of fascia-lata sutures. If fascial sutures are used at all, strips of external oblique aponeurosis, cut from either side of the incision in this structure and made when the inguinal canal is opened at the start of the operation, are by far the best. Such strips of fascia retain their connections with the aponeurosis below and can be so crossed as to re-form the pillars of the external abdominal ring. The fascial strips can be used to approximate the internal oblique muscle and conjoined tendon to the deep aspect of Poupart's ligament without causing any strain.

Hernias of the bladder may be divided into three varieties according to the relationship of the hernia to the parietal peritoneum: extraperitoneal, paraperitoneal, and intraperitoneal. The most common variety is the paraperitoneal. The possibility of a hernia of the bladder should always be kept in mind when operation is performed upon a direct hernia.

Femoral hernias must always be treated surgically because it is far too dangerous to apply a truss, which can never be made to fit properly and may cause strangulation. Table II shows the author's results in the treatment of primary and recurrent femoral hernia.

TABLE II.—RECURRENCE IN PRIMARY AND RECURRENT FEMORAL HERNIAS

Type	Total No. of Cases	Cases Traced	No. of Recurrences	Percentage of Recurrence
Primary	535	436	20	4.6
Recurrent	75	51	31	60.7

The author believes, according to his figures, that the high operation or the inguinal route for femoral hernia was responsible for most of the recurrences.

In addition, in a large percentage of cases, a direct inguinal hernia followed this high operation.

In the author's series there were two age groups of umbilical hernia: infants and adults. The results of the follow-up are tabulated as follows:

TABLE III.—RECURRENCE AFTER OPERATION FOR UMBILICAL HERNIA

Group	Total No. of Cases	Cases Traced	No. of Recurrences	Percentage of Recurrence
Infants	98	90	Nil	Nil
Adults	57	45	10	22.2

In infants, simple excision of the umbilical hernial sac is all that is required for cure, no reconstruction whatever being necessary. Mayo's operation for umbilical hernia in adults is best. This procedure gives excellent results with a low mortality.

SAMUEL H. KLEIN, M.D.

GASTRO-INTESTINAL TRACT

Church, R. E., and Hinton, J. W.: The Results of Gastro-Enterostomy in Gastric and Duodenal Ulcers. *Surgery*, 1940, 7: 647.

The results obtained as well as the method of study used by the essayists in 106 cases of gastro-enterostomy, on an average of seven and one-tenth years after operation, are significant.

The patients made a total of 2,694 visits to the clinic, an average of 25.4 visits each. Any merit this report may have lies in (1) a continuous personal contact between the patient and physician which resulted in the recording and studying of all complaints; and (2) the frequency of roentgenological studies. Church and Hinton have adopted the policy of making roentgenological examinations of each patient every six months. This personal follow-up method showed that statistics obtained by correspondence are of questionable value. For example, one patient in the series reported himself in a letter as "well," but the reports of another hospital showed re-operation for a recurrence. When the results are unsuccessful the patients do not return and do not respond to follow-up letters. Experience in this study has shown that the patients must be traced to their homes at frequent intervals if accurate data are to be obtained.

This material of 106 patients contained 96 males and 10 females with an average age of thirty-eight years and pre-operative ulcerations for five and six-tenths years. About 40 per cent of the patients were Irish, Italians, or Russians. There were 94 duodenal and 9 gastric ulcers, the site of the ulcers in 3 patients not being given.

The indications for surgery were as follows: severe pain; obstruction; perforation; pain and obstruction; pain and hemorrhage; obstruction alone; pain, hemorrhage, and obstruction; hemorrhage alone; and obstruction and hemorrhage. Malignant degeneration is a definite threat in all ulcer patients and although it may be considered an indication for surgery the authors were not very enthusiastic in using this as a compelling cause for operation.

The results of surgery showed that 24.5 per cent of the patients could be considered cured and 29.2 per cent benefited, which makes a total of 53.7 per cent who were benefited. Forty-six and two-tenths per cent were not benefited, however, and 17 or 16 per cent of this group required secondary operation for recurrence of symptoms. Of the 106 patients, 20 or 18.8 per cent had proved gastrojejunal ulcers with an average time of appearance of three and one-half years. *Hemorrhage occurred pre-operatively in 15 patients (14.1 per cent), but in 91 of the operated patients who did not have pre-operative hemorrhage, 15 (16.5 per cent) subsequently had postoperative hemorrhage.* In 19 cases of obstruction treated by gastro-enterostomy, 8 (42 per cent) were cured, 4 (21 per cent) were benefited, and 37 per cent were not benefited. This obstructed group included 3 cases of marginal postoperative ulcer, an incidence of 15.6 per cent.

The authors conclude that the results in their series "did not produce so favorable a view of this operative procedure as is generally presented by other authors, presumably because of the longer follow-up period adopted." SAMUEL J. FOGELSON, M.D.

Payne, R. T.: Cancer of the Stomach as a Surgical Problem. *Brit. J. Surg.*, 1940, 27: 740.

This article is a survey of the problem of cancer of the stomach mainly from the point of view of the surgeon.

The author first discusses the incidence and importance of the disease. For this form of cancer, as for the greater number of other forms, the statistics of most countries show a considerable rise in incidence during recent years. It is difficult to determine whether or not there has been any true increase in incidence, since it is certain that the greater accuracy in diagnosis and in the compilation of mortality tables, and the increase in the population living beyond the age of forty years have all been contributory factors in the apparent increase. This increase in incidence has been shared equally by the sexes. Cancer of the stomach becomes increasingly frequent with age. The occurrence of gastric carcinoma is approximately equal to the combined incidence of cancer of the large intestine and of the rectum.

With a disease of such frequency, the question of treatment becomes an urgent one. In the opinion of the author, surgery in the form of either partial or complete gastrectomy offers the only possibility of cure. Other methods of treatment, such as radiotherapy, or the use of lead and other chemicals can only be regarded as experimental or palliative, and they have not been responsible for any cures.

The problems of the pathology and pathological physiology of carcinoma of the stomach are then reviewed. These include the morbid anatomy, metastatic involvement, general nutrition, vitamin deficiency, and fluid balance; also dehydration, achlorhydria, hypochloremia, azotemia, and anemia. Gas-

tric cancer must be regarded not only as a local malignant process with all the characteristics of malignant disease, but also as a disease process which, by interference with the fundamental and diverse functions of the stomach, may profoundly influence nutrition and metabolism as a whole.

Attention is drawn to the protean and vague nature of many of the early symptoms. There is no one symptom or group of symptoms which is necessarily characteristic of cancer of the stomach, and this is an important factor in the difficulty of early recognition of the disease. Every case of "indigestion" arising in patients more than forty years of age should be subjected to detailed clinical investigation if early diagnosis is to be accomplished.

The author analyzes a series of 506 cases of gastric carcinoma, and discusses various surgical problems involved in the treatment of the disease.

The number of five-year cures reported in the literature at the present time represents but a small proportion of the cases of cancer of the stomach. However, earlier diagnosis and radical operation in a larger percentage of the cases should produce an improvement in the mortality rate.

SAMUEL H. KLEIN, M.D.

Yannicelli, R. B.: Intestinal Occlusion in the Newborn and Sucklings. Clinical and Roentgenological Aspects (La oclusión intestinal en el recién nacido y el lactante. Algunos aspectos clínicos y radiológicos). *An. Fac. de med. de Montevideo*, 1940, 25: 384.

The diagnosis of intestinal occlusion in infants presents great difficulties because the interpretation of the four classical symptoms, pain, vomiting, abdominal distention, and constipation, may be erroneous. Bilious or fecal vomiting points to a correct diagnosis. Diffuse distention of the abdomen frequently occurs in sucklings and is therefore of a minor diagnostic value, but circumscribed distention is highly suspicious. Visible peristalsis is an early sign of intestinal occlusion. A barium enema frequently helps to establish a correct diagnosis. Accumulation of air in the intestines, visible in roentgenograms, is a physiological phenomenon in newborn and sucklings, but a steadily increasing amount of air points to a mechanical occlusion. Vomiting in a newborn, accompanied by the expulsion of meconium, calls for an immediate roentgenological exploration. Intestinal colics in a suckling, more frequent or more intensive than those occasionally seen in a normal infant, suggest the possibility of an intussusception, and the diagnosis in such cases should be verified by fluoroscopic and roentgenographic examinations.

JOSEPH K. NARAT, M.D.

Wolff, S.: Recurrent Ileus (Rezidivierender Darmverschluss). *Ann. paediatr.*, 1940, 154: 211.

Poynton published an article in 1924 entitled "A Lecture on Acetonemia and Volvulus of the Small Intestine in Childhood" (*Lancet*, 1924, I, 1045), in which he reports the cases of 7 children at the ages of from three to seven years, whose cardinal symptoms were repeated attacks of severe vomiting, violent abdominal pains, marked obstipation, and acetone in the breath and urine. The first case with acetonemic vomiting ended in death. Of the remaining 6 cases, 5 ended in death. These proved to be instances of volvulus of the small intestine, as autopsy on 3 of the patients and operation on 2 others demonstrated. In these cases acetonuria is frequently merely a symptom. The article by Poynton is especially significant in that it shows that volvulus may occur in children and lead to violent, repeated crises, and then disappear again.

A case report is given of a case in a female child who originally presented typical manifestations of appendicitis. Upon opening of the abdomen, exudate was uncovered; the cecum itself was long and showed only light adhesions. Recovery followed the operation. A month later, however, there developed, despite the removal of the appendix, renewed indefinite abdominal attacks, this time of longer duration. The abdomen was extremely painful. Because of a suspicion of adhesions the child was reoperated upon under ether narcosis. Upon opening of the abdomen large quantities of exudate appeared under pressure. There were no characteristic findings other than marked reddening and swelling of the outer surface of the intestines; however, the presence of a so-called internal hernia in the region of the valve of Bauhin was determined. This was loosened. Three days later, because of the continued attacks of vomiting the child was reoperated upon under the suspicion of ileus. An abdominal anus was made in the region of the wound. The next day large quantities of stool were evacuated through the artificial anus, with subsequent recovery of the intestinal function. Months later the artificial anus was closed. Complete recovery of the child took place eventually.

(H. VIETHEN). JOHN W. BRENNAN, M.D.

Gabbianelli, L.: Two Cases of Lipoma of the Small Intestine (Su due casi di lipoma dell'intestino tenue). *Policlin.*, Rome, 1940, 47: sez. chir. 181.

Gabbianelli describes 2 cases in which recurring attacks of abdominal pain, and the presence of an elongated swelling in the upper right quadrant in 1 case, led to surgical exploration. A lipoma, the size of a pigeon's egg and located at the junction of the mesentery with the small intestine, was found to impinge on the intestinal lumen in the first case, and an easily reducible invagination of the small intestine, due to the presence of a lipoma the size of a nut and located on the side opposite to the mesenteric insertion, was discovered in the second case. Resection of the intestine was necessary in both cases.

Lipoma is one of the rarest forms of benign tumor of the gastro-intestinal tract; it develops usually in the colon and infrequently in the small intestine; it is generally submucosal, at times subserosal, and the muscular wall seems to constitute an impenetra-

ble barrier. Nevertheless, the lipomas in the present 2 cases were decidedly submucosal and subserosal at the same time. Lipomas are usually single and sessile, rarely peduncular, and may vary greatly in size. The symptoms depend less on the volume of the lipoma than on its location and may range from those of acute ileus caused by invagination to those of progressive obstruction. Intussusception is not characteristic of lipoma of the small intestine, in which the tumor itself in most cases does not cause any symptoms; but it is frequent in the colon where, in addition, the tumor gives rise to prodromal symptoms which lead to adequate treatment before the accident occurs.

The symptoms of duodenal lipoma vary with the location of the tumor and may be those of pyloric stenosis, or they may simulate those of vaterian cancer. Gastric lipoma may cause signs of stenosis if it is located in the vicinity of the pylorus. In the colon the presence of lipoma may be marked by alternating attacks of diarrhea and constipation.

Lipoma has rarely been found on palpation, but an invagination tumor has been felt in some cases. Invagination of the small intestine is facilitated by its active peristalsis, its mobility, the length of its mesentery, and the thickness of its muscular layer. In some patients with lipoma of the colon, the first symptoms may date back several years. Malignancy of the tumor is then excluded by the absence of cachexia, the persistence of canalization, and the blood picture. Roentgen examination may be important for the diagnosis of lipoma of the stomach because the filling defect is clear-cut and the peristalsis and mobility of the stomach are preserved. Roentgenography will not reveal submucosal lipomas in the small and large intestine, but may provide useful information in case of complications; invagination by itself contraindicates thorough investigation once its diagnosis is established.

The etiopathogenesis of intestinal lipoma is still obscure. It is a benign tumor, but complications may give it an unfavorable prognosis. Obstruction is to be feared most and may be caused by the mechanism of invagination, rarely by that of volvulus. Hemorrhage, perforation with consequent local or general peritonitis, and even spontaneous elimination of the lipoma have been reported. It is impossible to diagnose intestinal lipoma; it is always an operative finding. The treatment consists of enucleation with enterostomy or resection.

RICHARD KEMEL, M.D.

Bunch, G. H., and Doughty, R. G.: Chronic Obstruction of the Proximal Duodenum by Congenital Bands. *Ann. Surg.*, 1940, 111: 759.

Three cases of obstruction of the first and second portions of the duodenum by fibrous bands are presented. This condition is more common than is generally thought. The bands are congenital anomalies, probably remains of the anterior mesogastrium. They cross the second portion of the duodenum from below and terminate in the region of the gall bladder.

Differential diagnosis is to be made between this condition and atresia of the intestine, and also between it and congenital pyloric stenosis. In the case of atresia differential diagnosis is impossible pre-operatively, but congenital pyloric stenosis can usually be differentiated from obstruction due to bands because of the fact that patients with the latter start vomiting after the first feedings, have bile in the vomitus, and present no typical olive-shaped abdominal mass.

Because of flattening, constriction, and angulation of the duodenum due to the bands the proximal duodenum does not become dilated. The obstruction may be complete or incomplete, the former type requiring immediate operation, the latter usually pursuing a chronic course over many months or years with intermittent vomiting and chronic starvation. One of the cases was of the complete, 2 of the incomplete, variety.

Operative technique consists of division of the bands on the outer, avascular margin of the duodenum. Pre-operative and postoperative management is similar to that in cases of congenital pyloric stenosis except in the older patients. The authors are of the opinion that many cases of incomplete obstruction go unrecognized for years and that surgical exploration is indicated in patients with symptoms of high obstruction who do not respond to dietary management. RICHARD WARREN, M.D.

Ducuing, J.: Recovery Following Operation in a Case of Diverticulum of the Duodenojejunal Angle (Diverticule opéré et guéri de l'angle duodénojéjunal). *Presse méd.*, Par., 1940, 48: 517.

The author reports a case of diverticulum of the duodenojejunal junction in a fifty-three-year-old man. The previous history was not significant. The patient suffered with epigastric cramps which were particularly severe two hours after meals. His appetite was good but he lost 7 kgm. in weight during the last two months. Examination revealed tenderness in the right hypochondrium and epigastrium. Roentgenological study following a barium meal revealed a triangular shadow at the level of the intervertebral disk between the third and fourth lumbar vertebræ. In the oblique position the apex of the triangle, which was directed inferiorly, seemed to be connected to the duodenum at the duodenojejunal junction by a narrow band of barium. A diagnosis of diverticulum of the duodenojejunal angle was made.

Laparotomy was done under ether anesthesia and exploration revealed the diverticulum with its opening into the posterior superior wall of the duodenum at the duodenojejunal angle. The diverticulum was resected, and the posterior parietal peritoneum and the opening into the gastrocolic omentum were repaired. The postoperative course was uneventful and the patient was discharged as cured on the fifteenth postoperative day.

The resected diverticulum was about 4 cm. in length and about 2 cm. in diameter. Histological

examination revealed glandular mucosa of a normal duodenum with a thin muscular layer except near the orifice where it appeared slightly thicker than normal. MICHAEL DEBAKEY, M.D.

Huruya, S.: The Permeability of the Intestinal Wall for Bacteria, Especially in Circulatory Injury of the Colon (Beitraege zur Frage der Durchlaessigkeit der Darmwand fuer Bakterien, besonders bei zirkulatorischer Dickdarmschaedigung). *Arch. f. klin. Chir.*, 1939, 197: 211.

By means of animal experiments the attempt was made to determine under what conditions and at what time the colon, injured by interruption of the vascular supply of the mesocolon and ligation of the mesentery, becomes permeable for bacteria. After division of one or several blood vessels in the ascending mesocolon by means of a median laparotomy in adult rabbits, the abdominal cavity was again opened at another site twelve hours after the operation under the strictest asepsis, and then smears from the surface of the serosa were made every two hours up to twenty-fours hours for the bacteriological investigation. The findings were as follows:

Relatively often, directly after the operation, bacteria (mostly the staphylococcus albus) were demonstrated on the surface of the serosa both in smears and culturally; these were considered to be of ectogenic nature. They were introduced at the operation and were no longer demonstrable after twelve hours. With the division of a blood vessel of the ascending mesocolon, a partial necrosis of the intestinal wall frequently resulted within twenty-four hours. However, during this time bacteria did not penetrate through the intestinal wall into the free abdominal cavity. If two blood vessels of the ascending mesocolon were divided, complete necrosis of the intestinal wall resulted soon after fourteen hours, and within from fourteen to sixteen hours after the operation intestinal bacteria were already present on the intestinal serosa. They increased in number with the passage of time and could be demonstrated abundantly after twenty-four hours. In various cases, however, the surface of the serosa of the necrotic intestinal wall remained perfectly sterile. There was no basic difference between the conditions following the ligation of two and of more than two blood vessels of the ascending mesocolon. Necrosis of the intestinal wall and penetration of the intestinal bacteria occur somewhat earlier (ten to twelve hours) with the division of more than two blood vessels.

By means of histological investigations, it was shown that the penetration of the bacteria, which always follows the onset of the necrosis early, occurs essentially by way of the lymphatics. The blood vessels always remained free of bacteria. The author thinks that the possibility of the penetration of the intestinal bacteria is generally overestimated. With slight injury of the tissues the necrosis of the intestinal wall as a result of section of the blood vessels of the mesocolon with ligation of the mesentery definitely does not always injure the intestinal wall uniformly in its entire thickness; sometimes it is injured in its entirety and sometimes only in certain areas—the penetrating bacteria could never be demonstrated in the acute experiment. The kneading and massage of the portion of the intestinal wall separated from the mesocolon also could never bring intestinal bacteria into the abdominal cavity within four hours.

(WELCKER). LOUIS NEUWELT, M.D.

Koucky, J., and Beck, W. C.: Acute Non-Malignant Perforations of the Colon. *Surgery*, 1940, 7: 674.

Perforations of the colon into the free peritoneal cavity, excluding malignant lesions, are fortunately rare in occurrence. However, since they happen with sufficient frequency, their immediate diagnosis is most important. In the following discussion, the writers include only those perforations resulting from intraluminal sources. The most common cause is one of the complications of diverticulitis, foreign bodies, acute elevation of intracolonic pressure by enemas, or the occasional "compressed air injury."

Six cases are detailed to indicate that acute perforations of the colon occur often enough to warrant consideration of this possibility in all obscure cases of peritonitis. A previous diagnosis of colon diverticulum may often point to the correct diagnosis. In the early cases the peritonitis may be observed to originate about the descending colon, while in the late cases the picture is one of diffuse generalized peritonitis. The onset may be as sudden as that of a perforated peptic ulcer. Routine laboratory tests are of little value. X-ray studies, especially as regards the presence of pneumoperitoneum, are often of value. The use of the barium enema in colon perforations is contra indicated because of the chance of spill into the general peritoneal cavity.

Treatment must depend upon accuracy in diagnosis. The subacute perforations or those with limited leakage are best treated conservatively. Attempts at closure would seem to be justified in some acute perforations. Perforations due to disease do not permit accurate closure, because of the marked inflammatory reaction about the opening. In these, some type of exteriorization may be indicated. Drainage of the damaged segment, with or without colostomy above, may be the method of choice. Colostomy without exploration or any handling of the perforated bowel has resulted in recovery and is probably the procedure of choice. JOHN W. NUZUM, M.D.

Quénu, J., and Lignon, P.: In Defense of Delayed Resection after Exteriorization for Segmental Resection of the Colon in Cancers of the Left Colon (Défense de la résection différée après extériorisation pour la colectomie segmentaire dans les cancers du côlon gauche). *J. de chir.*, 1940, 55: 423.

Quénu and Lignon state that in 65 cases of cancer of the left colon which were operated upon, exteriori-

zation of the involved segment of the colon and resection after a delay of several days were done in 14 cases. The technique employed was that of E. Quénu, as described by Cruet in 1914. In 38 cases no resection operation was attempted on account of the extent of the lesion. In 27 cases resection was done by other methods; in 11 of these the cancer was in the rectosigmoidal area, in which naturally there is no possibility of exteriorization.

The technique used in the 14 cases involved three stages. In the first stage the segment of intestine that was the site of the tumor was exteriorized; the two layers of the mesocolon, left and right, were sectioned without injury to the blood vessels or glands; each of these layers was sutured to the corresponding surface from which the parietal peritoneum had been separated. Sutures were placed around the vascular pedicles. The afferent and efferent loops of the exteriorized segment were sutured in the incision in the abdominal wall, and compresses were placed around the exteriorized segment. In this way the intestinal segment was outside of the abdominal wall, and the vasculolymphatic pedicle outside of the peritoneum. In the second stage, from five to seven days after the first, the sutures placed around the vascular pedicle were tightened to secure hemostasis and the segment of intestine and vasculolymphatic pedicle were sectioned. The two ends of the intestine were partially sutured in their posterior circumference. In the third stage, after varying intervals, the artificial anus was completely closed by suture of the anterior circumference of the intestinal segments.

All of the 14 patients operated upon by this method made a good postoperative recovery, without complications, although half of them were more than sixty years old. This indicates that the operation is unusually well tolerated, and this is because it is entirely extraperitoneal. In the first stage neither the intestine nor the vasculolymphatic pedicle is cut; the space in which this operation is to be done is merely prepared. By delaying the resection operation, the intra-abdominal, but extraperitoneal, surface partially heals; its walls are covered with fibrin and later with granulations; at the base of this cavity is the intestinal segment and its vasculolymphatic pedicle. They also are covered with granulation tissue; thus the intestine can be opened and the lymphatics sectioned without danger. The means of hemostasis are provided by the sutures placed in the first-stage operation, and there is very little bleeding. The first stage is the most important in this operation. In 2 of the cases included among the 38 in which resection was not done, the exteriorization of the colonic segment was carried out, but the patients died. In 1 of these cases the tumor of the colon was found at operation for a malignant ovarian tumor and a subtotal hysterectomy was done before the exteriorization of the colon. Death was due to bronchopneumonia and is to be attributed to the hysterectomy rather than to the exteriorization of the colon. In the second case, the tumor was very large and infected; in the process of mobilization, which was difficult, some of the infected glands broke down, and caused peritonitis. This case was definitely inoperable. As no resection of the colon was done in these cases, they have not been included in the authors' statistics of colonic resection. If they are included in the exteriorization operations, the mortality is 12 per cent (2 deaths in 16 cases). If they are not included, there was no postoperative mortality in 14 cases.

Of the 14 patients who were discharged from the hospital after operation, 1 could not be traced; 1, a woman sixty-two years old, with Pott's disease and hemiplegia, died suddenly two months after discharge. Of the remaining 12, 6 died from two to nine years after operation. In 2 of these cases death was certainly not due to recurrence of the cancer of the colon; in another case, death was probably not due to recurrence. In 2 cases death was known to be due to recurrence, and in a third case was probably due to recurrence. These 3 deaths all occurred in the course of the second year after operation. Of the 6 surviving patients, 4 are living and free from recurrence more than two years after operation, the 2 other patients less than two years. In all of these living patients, the artificial anus has been successfully closed. ALICE M. MEYERS

Grasso, R.: A Clinical Contribution to the Knowledge of Haustrocecal Invagination (Contributo clinico alla conoscenza della invaginazione haustracecale). *Policlin.*, Rome, 1940, 47: sez. prat. 905.

Grasso describes the case of a boy, aged fourteen years, who presented the clinical symptoms of acute appendicitis and was found to have an invagination of the second segment of the cecum opposite the ileocecal junction. The invaginated segment was easily reduced and was found to be thickened, pale, edematous, with a gelatinous aspect, and some hemorrhagic stippling, and lardaceous on palpation. The remaining parts of the cecum and the last loop of the ileum were normal. Appendectomy and cecopexy were done. Recovery was uneventful.

This was, consequently, a case of typical and recent partial or parietal haustrocecal invagination, of which only 12 cases have been reported. As several cases have been described by the same author, it is hard to believe that the disorder is as rare as it appears to be from a review of the literature. Anatomically, it consists of a lateral invagination of one of the first three segments of the cecum between the anterior and the posterolateral longitudinal bands. Partial invagination of the appendix may accompany that of the first cecal segment. The invaginated part undergoes circulatory disturbances and may become gangrenous, which causes a syndrome absolutely similar to that of acute appendicitis. The symptoms in favor of invagination would be the sudden occurrence of this syndrome with signs of obstruction, the absence of fever, and the early presence of a painful cylindrical swelling in the right iliac fossa. Unfortunately, the signs are vague

and all symptoms may be absent. However, the differential diagnosis has no practical importance, as both disorders require immediate surgical intervention. A case has been reported in which the invagination caused a syndrome of chronic subocclusion. Roentgen examination might help to establish the diagnosis, but has not been used in any of the reported cases because of the urgency of the syndrome. Youth, and mobility of the cecum and all other anatomical changes of the cecum and of its portion of the mesocolic ligament have been cited as predisposing factors. Various interventions have been used by the various authors to suit individual cases. All patients have recovered and no recurrences have taken place. RICHARD KEMEL, M.D.

Sovena E.: Invagination of the Haustra of the Cecum (Sulle invaginazioni delle haustre del ceco). *Policlin.*, Rome, 1940, 47: sez. chir. 142.

The author reports 2 cases of invagination of the cecal haustra, describes the clinical and anatomical manifestations, and reviews the literature.

A twenty-year-old woman was seized with epigastric pains which later localized in the right lower quadrant. There was no fever, nausea, or vomiting. The clinical diagnosis was acute appendicitis. At laparotomy the cecum was found to be invaginated into the first part of the ascending colon. When this was corrected by manipulation, it was discovered that the first haustrum of the cecum was invaginated between the anterior and posterolateral tænia. Since the wall of the cecum was thickened, congested, and edematous, and since there was a tendency of the invagination to recur, a right hemicolectomy was done with a lateral anastomosis of the ileum to the transverse colon. The patient made an uneventful recovery. Upon removal of the cecum it was noted that the haustrum contained some trichocephali which were the cause of the invagination. There were numerous small ulcers throughout the mucosa of the cecum. The appendix was normal and showed no inflammation on histological study.

In reviewing the literature the author quotes Kyiovsky as to the etiology: the predisposing factor is a mobile cecum; the immediate exciting factor may be ulcers, tumor, foreign body, spasm, or inflammation. In his own cases Kyiovsky reported an accumulation of oxyuris in the cecum as the cause. In the author's 2 cases the occurrence of trichocephali which caused ulceration in the cecum and even burrowed into the cecal wall were the immediate cause of the invagination. The author ascribes the greatest rôle to intestinal parasites, which he discusses in detail. JACOB E. KLEIN, M.D.

Goyena, J. R., Itoiz, O. A., Niño, F. L., and Bosch Arana, G.: The Diagnosis and Treatment of Acute Appendicitis (Diagnóstico y tratamiento de las apendicitis agudas). *Rev. Asoc. med. argent.*, 1940, 54: 229.

GOYENA states that the early diagnosis of acute appendicitis is urgent because the immediate treatment and the prognosis depend on it. Pain is generally the first symptom to appear; vomiting, constipation, and fever combine with it to make the patient seek medical advice. The physician immediately suspects an acute abdominal process and particularly appendicitis, but should not forget that many other diseases may produce a similar picture. Examination of the patient will provide the elements to establish the diagnosis; his general condition will vary with the clinical type of the disease and his pulse will give valuable information on this point. Induced pain is never absent and its site will depend on the localization of the diseased organ; it may even be found in the left iliac fossa or in the cul-de-sac of Douglas. The induced pain is associated with hyperesthesia and often hyperalgesia of the skin. The abdominal reflexes may be decreased or absent. The most significant sign is abdominal defense, which, however, may be absent as a result of muscular fatigue or of the grave general condition of the patient; on the other hand, if the appendix is located posteriorly, the defense may be found in the lumbar muscles. There may be dissociation of temperature and pulse, especially in complicated cases, and the temperature may be normal or subfebrile in the axilla but high in the rectum.

ITOIZ discusses the pathological anatomy of acute appendicitis, which includes two distinct intestinal diseases: inflammation of the wall and occlusion of the lumen. He distinguishes three different anatomical forms. Catarrhal or congestive appendicitis is the initial form of any variety of the disorder and corresponds to slight attacks, the repetition of which is erroneously called chronic appendicitis by many physicians. There is slight swelling of the organ and dilatation of the subserous capillaries without exudation on the peritoneal surface. The process is limited to the mucosa. Appendicitis is present when histological examination reveals inflammatory infiltration of the submucosa and subserosa. Suppurative appendicitis begins at the bottom of one of the crypts from which the abscess spreads, especially in the loose tissue of the submucosa. The epithelial covering is destroyed only at the points of evacuation of the small abscesses, but these points may fuse together to form an ulcer. Gangrenous appendicitis is due to interruption of the circulation; it may be localized and is then usually caused by compression of the inflamed wall by a coprolith, or it may be generalized and is then caused by embolism or thrombosis of the appendicular circulation or by acute obstruction of the appendix; death from peritonitis is the rule within from forty-eight hours to six days. If perforation occurs in suppurative appendicitis, the focus is usually already isolated from the peritoneal cavity by epiploic adhesions, and a periappendicular abscess forms; if perforation occurs in acute obstruction, the evolution is rapidly fatal. Clinically, appendicitis may start suddenly during perfect health (obstruction), or gradually after prodromal

disturbances lasting several days (catarrhal or suppurative forms); in this case it may regress spontaneously; however, all three forms may end in perforation and death by acute peritonitis.

NIÑO discusses the bacteriology and serum treatment. Numerous aerobic and anaerobic bacteria have been found in appendicitis, but among the aerobes, the bacillus coli is present in 85 per cent of the cases, and among the anaerobes, the bacillus perfringens in 30 per cent. The great mass of acquired data reveals: (1) the presence in all appendices of two types of bacteria: aerobic with predominance of the bacillus coli, and anaerobic with predominance of the bacillus perfringens; (2) the possibility that the primary lesion of the wall is caused by the streptococcus viridans arriving by the circulatory route, with secondary invasion by the complex appendicular flora; and (3) the evident part played by anaerobes, and especially by the clostridium welchii, in the acute gangrenous and perforating form of appendicitis, which justifies the use of polyvalent anti-gangrenous serum associated with anti-colon-bacillus and anti-streptococcus serums to prevent the grave complications of the disease or to cure them when they are already established.

BOSCH ARANA insists on the necessity of immediate surgical intervention as soon as the diagnosis of appendicitis is made, and even in case of doubt. He uses local anesthesia and he associates percaine with novocaine to obtain a more complete and prolonged action. He considers McBurney's incision as the best, taking care to cut the peritoneum close to the border of the rectus muscle. Eventrations are exceptional and drainage of all parts can be attended to under perfect conditions. The incision must be long enough to allow good visual control of the operation. Whenever possible, he resects the ileocecal membrane; he ligates the base of the appendix and invaginates the stump. In gangrenous and perforated appendicitis, and in localized abscess in which he cannot extirpate the appendix, he drains with a rubber tube and gauze. In generalized peritonitis, he uses focal and Douglas' cul-de-sac drainage and does not interfere with the appendicular regional process; if the latter suppurates, he intervenes immediately and leaves the entire wound open. He discusses postoperative complications and their treatment: infection of the abdominal wall, generalized peritonitis, fecal fistula, ileus, and pleuropulmonary accidents.

RICHARD KEMEL, M.D.

Dennis, C., Buirge, R. E., Varco, R. L., and Wangensteen, O. H.: Studies on the Etiology of Acute Appendicitis: An Inquiry into the Factors Involved in the Development of Acute Appendicitis Following Experimental Obstruction of the Appendical Lumen of the Rabbit. *Arch. Surg.*, 1940, 40: 929.

The authors have studied the secretory capacity of the cecal appendage, the factors which alter its secretory capacity, and the effects of appendical obstruction in 235 rabbits. The following observations were made:

1. Proof of a secretory capacity was established by the collection of from 20 to 80 c.cm. of fluid daily from obstructed, incannulated appendages.

2. Obstruction of the cecal appendage by ligation of its base resulted in the development of acute appendicitis distal to the point of ligation. The portion of the appendix which was proximal to this point did not manifest acute inflammation.

3. When the appendical base was ligated and the intraluminal pressure was prevented from rising, the characteristic pathological changes could not be demonstrated.

4. Obstruction of the appendical base was followed by an increase in the intraluminal pressure. The appendage filled tensely. Areas on the surface blanched and became ischemic, occasionally hemorrhagic, and finally gangrenous. After about eight hours rupture of the organ released the tension and was followed by the development of local peritonitis, general peritonitis, and the extensive formation of adhesions. These inflammatory processes were observed through glass windows placed in the abdominal wounds.

5. Preliminary irrigation of the appendical lumen did not alter the experimental results.

6. Epinephrine administration produced a diminution of fluid secretion by the incannulated cecal appendage.

7. The age of the animal had no effect upon the secretory rate of the appendix.

8. Appendicostomy was followed by a decrease in the secretory rate which, however, was inadequate to prevent a fatal outcome following closure of the stoma.

9. Previous elevation of the intraluminal pressure produced a slowing of the pressure rise in subsequently obstructed appendages.

10. Prolonged intraluminal pressure at a fixed level produced a decrease in the rate of fluid secretion by the obstructed incannulated appendix.

11. The administration of cathartics did not significantly alter the course of the disease although the average period of survival was longer in animals which received croton oil or castor oil than in the control group.

12. Operative trauma to the mucosa is not necessary for the development of acute appendicitis in a rabbit with an obstructed appendical lumen.

From these observations the authors conclude that acute appendicitis following ligation at the base of the rabbit's cecal appendage must develop in the following manner:

A rise in the intraluminal pressure increases the tension on the appendical wall. Some of the blood vessels are pinched off and foci of ischemic necrosis appear. These foci offer a weakened area through which rupture may occur and provide an open field for any organisms which may be present.

EDWARD W. GIBBS, M.D

Gatch, W. D., Gery, R. E., and Ballenger, F.: The Management of Advanced Appendicitis in Childhood. *J. Am. M. Ass.*, 1940, 114: 1839.

In most cases of perforating appendicitis the peritoneum is able to defend itself and to overcome the infection or localize it in the form of an abscess. In either event delayed operation is a satisfactory method of treatment, although the period of illness is usually prolonged and the severity of the complications is increased. However, if perforation of the appendix is accompanied by a sudden outpouring of intestinal contents, or if rupture of adhesions around a tense abscess occurs, delayed operation may be disastrous. Only by early operation can the presence of these more dangerous types of appendicitis be detected.

The authors report their results in the treatment of advanced appendicitis in 135 children under sixteen years of age. Immediate operation was performed in 119 cases. In 112 of these cases the appendix was gangrenous and perforated. In the remaining 7 cases an abscess was drained without appendectomy. Only 1 patient in this group died, a mortality of 0.83 per cent. This patient's death was not due to peritonitis.

Conservative treatment was given to 16 children. Three of these died, a mortality of 18.7 per cent. All 3 of the deaths were attributed to general peritonitis although these patients were, on the whole, no more seriously ill at the time of admission to the hospital than were those who had been treated by immediate operation.

The low mortality which occurred among the children treated by immediate operation is attributed to the use of proper surgical technique and postoperative care. The authors advocate the use of a McBurney incision, suction and gentle sponging, removal of the appendix and inversion of the stump, abundant and thorough drainage, interposition of the omentum between the drains and the intestines, and loose closure of the abdominal wound.

The most important part of the postoperative care is adequate control of the body fluid balance. The pathological, physiological, and chemical changes which occur in the patient with general peritonitis resemble those which follow a total cutaneous burn. The surface area of the peritoneum and the skin area are approximately equal. Both of these tissues respond to irritation by inflammation and exudation. Most of the toxic symptoms of peritonitis are due to loss of blood protein through damaged capillary endothelium with resultant fall of the osmotic pressure, blood concentration, and tissue edema. Injudicious administration of water in the presence of widespread peritonitis dilutes the blood protein and increases the hypoproteinemia. On the other hand, the use of frequent blood transfusions maintains the blood protein above the critical level and prevents the development of edema. The authors are convinced that the free use of blood transfusions has been a significant factor contributing to the low mortality which they are able to report.

From a study of their results it would seem that appendicitis is no more dangerous in children than in adults, although it is sometimes more difficult to diagnose in the former and, consequently, is more advanced at the time of operation.

EDWARD W. GIBBS, M.D.

Haggard, W. D., and Kirtley, J. A., Jr.: The Treatment of Acute Spreading Peritonitis Following Ruptured Appendix. *J. Am. M. Ass.*, 1940, 114: 1843.

Many patients with spreading peritonitis following rupture of the appendix are admitted to a hospital in poor condition for surgical treatment. The authors believe that it is a mistake to subject these patients to immediate operation as a matter of routine. Better results will often follow conservative treatment and delayed operation. Dehydration, acidosis, hypochloremia, gastric distention, and even circulatory collapse may be present and should be corrected before any surgical procedure is attempted.

The following method of treatment is recommended for this type of patient:

1. Nothing by mouth.
2. Wangensteen or Miller-Abbott tube for intestinal distention.
3. Parenteral administration of from 5,000 to 8,000 c.cm. of 5 or 10 per cent dextrose and isotonic saline solution daily.
4. Complete rest of the entire intestinal tract for from five to seven days.
5. Small blood transfusions.
6. Oxygen mask.
7. Fowler's position.
8. Hot fomentations or an ice bag to the abdomen.

Many patients with peritonitis will improve with this method of treatment. The inflammatory process will undergo resolution or result in the formation of a localized abscess. The latter can be safely drained on the twelfth or fourteenth day. If resolution occurs the appendix should be removed eight weeks later.

If the patient's temperature does not subside after a week, if a palpable mass increases in size, or if pain increases in severity after four or five days, operative treatment may be suggested. If the temperature increases, the pain continues, and the physical signs do not recede, immediate operation becomes imperative.

The authors contend that if an abscess is present and removal of the appendix will necessitate a breaking down of nature's barriers, drainage alone is preferable to appendectomy and drainage.

EDWARD W. GIBBS, M.D.

Rinesi, R.: The Treatment of the Appendical Stump and Its Complications (Accidentes y tratamiento del muñón apendicular). *Bol. Soc. de cirug. de Rosario*, 1940, 7: 31.

The author reports 4 appendectomies in which infection of the stump was followed by peritonitis; 3 of the patients died. He employs either a simple ligation of the stump or ligation plus inversion. A

careful analysis of the cases leads him to the conclusion that the greatest amount of attention should be paid not so much to the mode of treatment of the stump as to a correct pre-operative therapy, proper selection of the anesthetic, and gentle handling of the inflamed appendix.

The author favors invagination of the stump, followed by a purse-string suture, provided that both steps can be performed rapidly with the help of a well trained assistant. JOSEPH K. NARAT, M.D.

Steenrod, E. J.: Anorectal Actinomycosis. *Am. J. Surg.*, 1940, 48: 567.

Actinomycosis of the rectum and anus is rare. There are only 17 reported cases, 16 of which are in the foreign literature. The author adds a case, reporting anorectal actinomycosis in a male aged seventy years.

Although the portal of entry of the infection is unknown, it is suggested that contamination of any anorectal wound by cleansing with leaves or grass may offer direct contact for the actinomycetes. Four phases of the disease were described by Bensaude. The initial phase consists of proctitis which is accompanied by fever, abdominal cramps, and diarrhea or constipation. The second phase is one of woody infiltration; the third phase consists of the formation of abscesses and fistulas. The fourth phase is one of complications: (1) those which occur *in situ*, such as multiple deep fistulas, abscesses which result in the formation of cavities, and stenosis of the anus and rectum; (2) those which occur by continuity, such as involvement of the pelvic viscera; and (3) those which occur at a distance, such as abscesses of the liver and septicemia.

Lesions in bone are uncommon, and may result from the secondary infection that accompanies the disease, rather than from direct invasion of bone by the fungus.

The diagnosis depends upon the demonstration of "sulfur granules" in the pus obtained from one of the sinuses, or in a specimen of tissue examined microscopically. The author's patient had had several operations for fistula-in-ano before coming to the clinic, where "sulfur granules" were finally found in the exudate from one of the abscesses. Roentgenograms revealed an irregularity of the left margin of the lower sacrum, which was interpreted to be due to actinomycosis.

There is no specific treatment, but the author recommends surgical drainage of the abscesses with a minimal amount of manipulation, sufficient doses of potassium iodide, and a satisfactory regimen of high-voltage roentgen therapy. The author's patient received beginning doses of 25 gr. (1.6 gm.) of potassium iodide three times a day. Gauze packs saturated with Lugol's solution were applied within the walls of the abscess and fistulas. Deep roentgen therapy was administered. Desjardins advises the administration of from 400 to 500 roentgens generated at a potential between 140 and 200 kv. and filtered through 6 mm. of aluminum or 0.75 mm. of copper, the dosage depending upon the size of the patient.

Three years after the diagnosis was made, the patient is in good health, the sinuses are practically healed, and the bony lesion is apparently much improved. At present the patient is receiving between 60 and 80 gr. (4 to 5.2 gm.) of potassium iodide three times a day, and the sinuses are washed with hydrogen peroxide, which procedure is followed by the insertion of packs saturated with Lugol's solution twice daily. The skin must be protected with vaseline while these packs are in place. As evidence that iodides are of definite therapeutic value, the author mentions that at one time during the course of treatment, iodides had to be discontinued because of signs of iodism, during which time some previously healed sinuses reappeared, and the general condition became worse. Upon resumption of the treatment, definite improvement was noted.

HAROLD LAUFMAN, M.D.

Dukes, C. E.: Cancer of the Rectum: An Analysis of 1,000 Cases. *J. Path. & Bacteriol.*, 1940, 50: 527.

This is a comprehensive analysis of cases operated upon by excision for carcinoma of the rectum at St Mark's Hospital, London. It was found that rectal cancer was twice as common in men as in women, and the average age of onset for women was considerably earlier than for men. The age at the time of surgical treatment in women was fifty-five and one-tenth years, and in men fifty-eight and six-tenths years.

The disease is more likely to spread more extensively in young patients than in the middle-aged or elderly. This was determined by recording the spread of cancer to regional lymph nodes. The incidence of lesions in the lower third of the rectum was 36.6 per cent, in the ampulla (middle third) 32.6 per cent, and in the upper third 30.8 per cent.

In the specimens examined, most cancers had the form of oval ulcers from 2 to 3 in. in diameter, with their long axes in the horizontal plane. Multiple primary malignancies were present in 2.9 per cent of the excised rectums, but it is probable that if the whole colon could have been excised this figure would be higher. Therefore, some cases of alleged recurrence after excision of the rectum may be due to a second unsuspected primary growth. Secondary tumors resulting from venous extension appear to be due to reëruption to the surface by growth within small veins of the submucosa. Multiple primary cancer is especially common in cases of polyposis intestini.

The tumors were classified according to the grade of malignancy (Broder), as well as to the degree of penetration into the wall (Dukes). Tumors of high-grade malignancy are most frequent in young patients. There is a close relationship between the degree of malignancy as revealed histologically and the extent of lymphatic and venous spread.

In only 15 per cent of the cases was the growth restricted to the rectal wall (Group A) at the time

of excision. In about 35 per cent the growth had spread by direct continuity into the perirectal fat, but had not yet caused lymphatic metastases (Group B). Lymphatic metastases were found in about 50 per cent of the excised specimens (Group C).

Venous spread of rectal cancer is of great importance in view of the frequency of secondary growths in the liver. Evidence of the extension of rectal cancer within the lumen of hemorrhoidal veins was found in approximately 18 per cent of the operative specimens. Evidence of lymphatic permeation was encountered in about 15 per cent of all the cases, consisting mostly of growths of high-grade malignancy. HAROLD LAUFMAN, M.D.

LIVER, GALL BLADDER, PANCREAS, AND SPLEEN

Twiss, J. R., Carter, R. F., and Hotz, R.: The Determination of Biliary-Tract Infection with the Encapsulated Duodenal Tube. *Ann. Int. Med.*, 1940, 13: 2104.

In this communication the authors have attempted to correlate the pre-operative and operative bacteriological findings in a series of 120 patients with chronic biliary-tract disease. In each case pre-operative duodenal drainage was performed under sterile precautions and the bacteriological findings of the duodenal bile were compared with the specimens obtained from the biliary tract at operation. The duodenal drainage was performed with a special tube which had previously been described by the authors. This tube attempts to avoid contamination from the stomach and upper intestinal passages by covering the bucket with a special capsule. This capsule dissolves in the duodenal chyme which uncovers the bucket through which the duodenal material is obtained. The encapsulated method gave a considerably higher incidence of sterile cultures and more cultures of organisms significant of biliary-tract infection than that found with the "open" method. Sterile cultures were obtained in all specimens of duodenal bile in 75 patients or 63 per cent of the series, and one or two types of organisms considered significant of biliary-tract infection in 32 patients or 26 per cent. It was, therefore, apparent that findings considered satisfactory for diagnostic purposes were obtained in 89 per cent of the patients, whereas contaminations resulted in 11 per cent.

A comparative study of bacteriological cultures of duodenal bile and of the specimens obtained at operation showed that 74 of the 75 patients having sterile cultures of duodenal drainage also had sterile cultures of the biliary tract at operation. Of the 28 patients having positive cultures both in the duodenal bile and in the biliary tract, 25 had the same type of organisms in the biliary tract that had been cultured in the duodenal bile. Of the remaining 20 patients having positive cultures of the duodenal bile, 17 had negative results at operation and 3 showed organisms in the biliary tract different from those in the duodenal drainage bile. In only 1 patient a single sterile pre-operative specimen was not confirmed at operation, the biliary tract revealing the streptococcus. There was disagreement between the duodenal drainage and the operative findings in 21 cases or 17 per cent of the total series. The diagnostic accuracy of the duodenal drainage findings may, therefore, be considered to be 83 per cent. The authors state that by eliminating the 13 cases of disagreement obviously due to contaminations of duodenal bile, the diagnostic accuracy of the drainages is increased to 93 per cent. They hope that more experience with the encapsulated method will further reduce the incidence of contamination of the duodenal bile. WILLIAM C. BECK, M.D.

Mallet-Guy, P.: Biliary-Intestinal Anastomoses: Late Results. Functional Results (Des anastomoses bilio-digestives: résultats éloignés. Résultats fonctionnels). *J. de chir.*, 1940, 55: 303.

French surgical opinion is generally in favor of biliary-intestinal anastomosis in which the gall bladder is used, whereas German opinion has been in favor of anastomosis in which the common duct is used. Laboratory experimentation has brought to light the following facts:

Anastomosis with the jejunum and colon leads to poor results. A continual intestinal reflux occurs in anastomosis with the gall bladder. Cholangitis is a common sequel. The duodenum and the stomach are about equally suitable for anastomosis. There is no relationship between the permeability of the bile duct and the subsequent patency of the stoma.

In the dog choledochoduodenostomies always result in infection and pancreatic reflux often causes liver necrosis. The dog's biliary tree is much more easily infected than man's. A method of preventing ascending infection is isolation of the part of the intestinal tube which is the site of the anastomosis. End-results of 43 anastomoses in which the gall bladder was used show 27 complete cures, 8 fair results, 3 cases of scar contracture of the stoma, 1 case which required a later gastro-enterostomy, 1 case of cholangitis, 1 case of late neoplasia of the mucosa of the stoma, and 2 deaths after six years. The author believes this operation is as satisfactory as any.

X-ray examination of 30 personal cases of cholecystogastrostomy with the aid of barium showed the patency of the stoma in 18 cases. In no case was air or barium seen to regurgitate into the main biliary tree. On the other hand, it has been reported that cholecystoduodenostomy allows such regurgitation in many cases (Guleke). The use of the Einhorn gastroduodenal tube helps to determine the patency of the stoma. Gastric acidity is not altered by the operation. The author believes the gall bladder is a barrier to infection between the intestine and the biliary passages.

The author's end-results in cases of choledocho-enterostomy are as follows:

Anastomoses over prosthesis without direct suture produced 16 good, 3 fair, and 19 poor results. Terminolateral anastomoses after hepaticojejunos-

tomy produced 3 good and 1 fair result and 1 fatal cholangitis; after hepaticogastrostomy, 4 perfect and 4 mediocre results, and 1 fatal cholangitis; and after hepaticoduodenostomy 42 excellent, 13 fair, and 42 poor results. Side-to-side choledochoduodenostomy produced 37 good, 14 fair, and 17 poor results. These operative results are shown in 84 x-ray examinations of such cases. The presence of air in the biliary tree is common and the incidence of barium reflux is great.

Experiments made in conjunction with R. Kempf have shown that the pressure in the common duct after anastomosis to the duodenum is from one-half to one-third of normal. A meal will raise this pressure and prevent the entrance of the food into the biliary tree.

Therapeutic implications are to be drawn from this study. The stoma should be made from 2 to 2½ cm. wide to prevent stricture. If there is a chance of pyloric obstruction a simultaneous gastroenterostomy or a gastrectomy of exclusion should be done to prevent reflux of food into the cholecystogastrostomy. It is only in pyloric obstruction that this occurs. RICHARD WARREN, M.D.

Heyd, C. G.: Factors of Mortality in 4,000 Operations upon the External Biliary System. *Ann. Surg.*, 1940, 111: 820.

An analysis of a group of 3,986 patients who were operated upon for gall-bladder disease was made to determine what the factors were that determined death. There were 309 deaths, a mortality of 7.7 per cent.

When gall-bladder disease is complicated by involvement of the common duct the mortality is raised from 3.61 per cent to 11.34 per cent. The mortality risk inherent in surgery upon the common duct is more than three times greater than the risk of simple, uncomplicated cholecystectomy.

The operation of cholecystostomy represented only 2 per cent of the total operations for chronic gall-bladder disease. Among 3,306 operations for chronic cholecystitis, cholecystostomy was performed only 66 times, with a mortality of 33.3 per cent. Cholecystogastrostomy was performed 50 times, and cholecystoduodenostomy 2 times, with a mortality rate of 28.8 per cent. Thirty-six of the 52 anastomotic operations were for carcinoma and 16 for obstructive pancreatitis.

Choledochostomy for postoperative stenosis of the common bile duct or stones overlooked at operation was attended by a mortality rate of nearly 40 per cent.

Multiple surgery is one of the most outstanding factors in increasing the mortality rate. In 575 operations, cholecystectomy was combined with one or more other operative procedures, with an average mortality of 13.85 per cent, which was nearly four times higher than that of cholecystectomy alone, namely, 3.61 per cent. These "secondary" operations were inherently dangerous, and carried their own mortality rate if performed as a single operation for acute gangrenous appendicitis, gastroduodenal ulcerations, or fibromyoma of the uterus.

Jaundice, in any degree, was a most impressive factor in the increased mortality in chronic cholecystitis, for in 254 patients with jaundice at the time of operation, the mortality rate was 13 per cent. Eighty-six per cent of these patients had stones in the common bile duct.

Forty-six cases of perforation of the gall bladder occurred in so-called chronic cholecystitis, with a mortality of 19.5 per cent. Nine of the patients had perforations into the colon.

Cholecystostomy for chronic cholecystitis proved to be inadequate. Sixty-eight patients, after a cholecystostomy, were subsequently operated upon for recurrence of the symptoms, with a mortality of 7.4 per cent, as contrasted with 3.61 per cent for primary, non-complicated cholecystectomy.

There were 574 cases of acute cholecystitis, and the diagnosis of acute cholecystitis was made by the pathologist, after an examination of the gall bladders from 542 patients. In 32 cases no pathological examination was made as the patients had a cholecystostomy, but they were classified as having acute cholecystitis. Cholecystostomy for acute cholecystitis was not an unmixed blessing, as even when the patients recovered from the primary operation, subsequent surgery for the retained gall bladder gave a mortality of 20 per cent.

The mortality following operation for acute cholecystitis is shown in the table, the cases being subdivided according to pathological diagnosis:

TABLE I.—ACUTE CHOLECYSTITIS. PATHOLOGICAL ANALYSIS OF 574 OPERATIONS

(Summary)

Pathological diagnosis	No. of cases	Per cent of total	Mortality per cent
Acute cholecystitis	206	36.0	5.85
Purulent cholecystitis	117	20.4	9.40
Gangrenous cholecystitis	150	25.9	7.33
Perforated, with abscess	16	2.8	0.00
Perforated, with peritonitis	53	9.2	35.85
No pathological report	32	5.7	34.40
Total cases	574	100.0	10.97

The mortality in acute cholecystitis was remarkably influenced by pre-operative hospital treatment (Table II).

TABLE II.—THE MORTALITY AND MORBIDITY IN ACUTE CHOLECYSTITIS IN RELATION TO THE LENGTH OF PRE-OPERATIVE HOSPITALIZATION

Duration of observation period	No. of cases	Per cent perforated	Mortality per cent
0 to 6 hours	128	10.0	15.6
6 to 24 hours	297	13.1	7.4
24 to 48 hours	56	8.6	10.35
2 to 24 days	93	12.8	17.60
Totals	574	12.1	10.97

It may be assumed, therefore, that an immediate operation for acute cholecystitis, that is, an operation within six hours after admission, is seldom indicated. Adequate pre-operative treatment from six to twenty-four hours is sufficient to insure the best results. Jaundice at the time of operation for acute cholecystitis increased the operative hazard, for 155 patients with acute cholecystitis complicated by jaundice were operated upon with a mortality of 20.6 per cent. In the patients who had acute cholecystitis but were not jaundiced at the time of their operation but had a history of previous attacks with jaundice, the mortality among 101 patients was 15.8 per cent, contrasted with the basic mortality of the cases of acute cholecystitis operated upon between six and twenty-four hours, namely, 7.41 per cent.

From this study, there emerge certain very definite conclusions. It is evident that chronic biliary disease is a continuous and progressive pathological condition and that the mortality and morbidity of this disease varies with the chronicity of the process itself, with the intrinsic pathological changes, with the complications, and with the physical status of the patient. Surgery for chronic biliary disease is sufficiently dangerous to be the only operative procedure which should be performed. The outstanding death-producing conditions in order of frequency were as follows: (a) peritonitis; (b) pulmonary complications; and (c) varying states of hepatic insufficiency.

In regard to acute cholecystitis there is no warrant for what may be termed the "immediate" operation, that is, surgical intervention upon patients within six hours after admission to the hospital. The best results in acute cases, so far as mortality and morbidity are concerned, were obtained in the group of patients who were prepared for operation from not less than six hours up to twenty-four hours after their admission. Conservative treatment and watchful waiting, while they may appear temporarily successful, are eventually disastrous for the patient.

In the pathology of acute cholecystitis the mortality factor and the severity of the disease are increased when the patient has had previous attacks of icterus. Jaundice adds approximately 100 per cent to the mortality factor.

Cholecystostomy has a definitely higher immediate mortality than cholecystectomy, and has a more marked increase in the eventual mortality. Approximately 50 per cent of the patients with a cholecystostomy require re-operation, which carries with it a secondary mortality close to 20 per cent. The most successful results were obtained in the group of 959 patients who were operated upon within two years after definitely demonstrable gall-bladder symptoms appeared. This low mortality, 1.35 per cent, was obtained in this series of cases regardless of the age of the patient, and is in contrast to the general cholecystectomy mortality of 3.61 per cent.

In the beginning of this series (1920) exploration of the common duct was carried out only in the presence of very marked disease of the common duct or associated pancreatitis. As the precision of operative technique became thoroughly established, more common ducts were explored, with better results and less mortality. The importance of disease of the common duct and of primary exploration is apparent from a consideration of the statistics. Drainage of the common duct for cholangitis or calculus at the first operation, and when combined with cholecystectomy, does not give a prohibitive mortality (11.34 per cent); whereas a secondary choledochostomy in a previously cholecystectomized patient has a mortality which is approximately 350 per cent greater than that which attends primary exploration (38.60 per cent).

SAMUEL H. KLEIN, M.D.

Benedetti-Valentini, F.: The Surgical Treatment of Acute Cholecystitis in the Typhoid Patient (Circa il trattamento chirurgico della colecistite acuta nei malati di tifo). *Policlin.*, Rome, 1940, 47: sez. chir. 125.

The author refers to the severe type of acute cholecystitis occurring after the fever has subsided toward the end of an attack of typhoid. In this condition the entire wall of the gall bladder is involved; it may become gangrenous and perforate and the patient may die of septic peritonitis within forty-eight hours. For these patients the author favors cholecystotomy rather than cholecystectomy as the surgical procedure of choice. He reports 5 such cases, in 3 of which rupture occurred into the free peritoneal cavity. He notes the frequent occurrence of calculi in these cases and considers them responsible for the tendency to perforate.

The first case was that of a forty-year-old female who was admitted with an acute abdominal syndrome diagnosed as perforation of the gall bladder. Two months previously she had become severely ill with typhoid fever. After one month the fever returned with associated pain in the right hypochondrium. The condition was treated conservatively by capable internists, who at first discouraged surgical intervention. However, as the patient became worse, resort was made to surgery. An enlarged, thickened, greenish-brown necrotic gall bladder was found with a large ulceration near its neck, and several large gall stones had fallen into the peritoneal cavity. The gall bladder was removed and a Mikulicz drain inserted. Nevertheless the patient died within forty-eight hours of generalized septic peritonitis.

In the author's series of 5 cases 3 patients died. The author favors cholecystotomy. Whenever immediate drainage is not urgent he advises, first, fixation of the fundus of the gall bladder to the abdominal wall, and, later, opening of the gall bladder for drainage in order that the abdominal cavity not be contaminated.

JACOB E. KLEIN, M.D.

Hofhauser, J.: Laboratory Studies of 400 Gall-Stone Operations (Laboratoriums-Untersuchungen bei 400 Gallenstein-Operationen). *Orvosképzés*, 1939, 29: 282.

The important characteristic factors of gall-stone disease which are permanently progressive with occasional regressive periods are: infection, inflammation, and dysfunction. The object of bacteriological studies and experiments was to determine, if possible, the ultimate cause of gall-stone formation.

Four hundred gall bladders were surgically removed and infected calculi were found in 36.5 per cent and sterile calculi in 63.5 per cent. Twelve other gall bladders which did not contain stones were removed for a relative indication. Three hundred and seventy-three of the patients were women (93.25 per cent) and 27 were men (6.75 per cent). Colon bacilli were found in most of the cases. Typhoid bacilli were cultured from the gall bladders of 12 women (3 per cent of the entire group of patients) and paratyphoid bacilli were cultured from 2 women (0.5 per cent). The contents of the bladder were infected in 30 per cent of the patients who were younger than the average age of forty-two years, and in 43 per cent of those who were older. Histological examination revealed partial or complete necrosis of the gall-bladder wall in 4 cases. In the group of patients who were older than forty-two years there were 3 malignant tumors, 1 tuberculous cholecystitis, and 1 gangrenous cholecystitis. In a thirty-eight-year-old woman the cystic duct was occluded by a pea-sized fibromyoma, and in a fifty-year-old woman the fundus of the bladder contained a cystadenoma of hazel-nut size. These were incidental findings.

The remaining 391 cases were of chronic cholecystitis of 3 different types: catarrhal, fibrinous, and ulcerative. The catarrhal form was the mildest and 32 per cent of the sterile cases and 19 per cent of the infected cases were of this type. In fibrinous inflammation there is a conspicuous thickening of the wall, particularly of the serosa. Seventy per cent of the 141 cases of this type were sterile. Ulcerative cholecystitis produced the greatest change. In half of these cases the gall bladder was sterile.

Under normal conditions the gall bladder is not a simple receptacle, but one which is provided with its own muscular wall, glands, blood vessels, and lymphatic channels. Abnormal function of the gall bladder is partly dynamic and partly chemical. The former produces dyskinesia which may simulate the symptoms and signs of cholelithiasis. The latter is a disturbance of secretion and resorption.

It was apparent from the material studied that most cases are operated upon in surgical clinics because of secondary or tertiary changes. A simple, uncomplicated, calculous gall bladder is a rarity. The exact period of gall-stone formation has not been well established. They are occasionally found during babyhood and even in the newborn.

The function of the gall bladder is determined by chemical analysis of its contents. The bilirubin content fluctuates to low and high values even in cases with very small stones (Pólya). Consequently, bile obtained by a duodenal tube is subjected to chemical analysis.

Additional information regarding gall-bladder function is obtained by studies of the organ after it is filled with an opaque substance. Intravenous cholecystography was done in 264 of the 400 cases. The information obtained in this manner turned the interest to cholesterol. Most authors believe that cholesterol is a product of dysfunction. The author agrees with this viewpoint. According to Aschoff, Backmesster, and Schueler gall stones are chiefly a result of inflammation, and not the converse. The author's studies favor the opposite conception. He believes that cholelithiasis is a progressive process which begins at a certain age and passes through different stages, such as normal gall bladder, simple dysfunction, simple inflammation, simple calculous formation, inflammatory calculous formation, and destruction of the gall bladder. In addition, there are gangrenous, necrotic, calcified, and atrophied gall bladders the walls of which surround a small lumen filled with stones and become adherent to adjacent structures and perforate into neighboring organs.

The question is: What is the factor which is consistently present with biliary complaints in the various stages? It is the author's opinion, from his studies, that this factor is dysfunction. Its association with cholesterin, metabolic changes, and consequent pathological deviations is not entirely clear, and the same is true of its association with calculous formation.

The author summarizes as follows:

It is apparent from the study of 400 gall bladders with stones and 12 without stones, which were removed for biliary complaints, that the cause of gall stone formation, which is established at an early period, should be sought in different combinations of the various forms of dysfunction. Infection and inflammation are secondary phenomena and other changes such as hemorrhage, necrosis, perforation, and cicatrization are tertiary products. When gall-stone formation occurs in cases with congenital absence of the gall bladder or after its operative removal, it is due to dysfunction of the bile ducts which replace the function of the gall bladder. Intrahepatic stone formation, therefore, must be traced back to an abnormal function of the epithelium of the intrahepatic bile ducts.

(E. Illés). Edward W. Gibbs, M.D.

McGowan, J. M., and Henderson, F. F.: The Prevention and Management of Pain Following Cholecystectomy. *New England J. Med.*, 1940, 222: 948.

Biliary colic following cholecystectomy is due to obstruction of the common duct which prevents the flow of bile into the duodenum. Obstruction of the common duct may be due to stone, stricture, edema, or spasm. The back pressure results in pain. Common-duct pressure of 70 mm. of water pro-

duces pain in some individuals, while 500 mm. may be withstood by others with impunity. Prolonged T-tube drainage allows the common duct to resist greater pressures. Glyceryl trinitrate relaxes duodenal spasm and tends to lower the resting intrabiliary pressure. The authors describe methods of studying the patency of the papilla of Vater and the condition of the bile ducts.

Biliary dyskinesia and many symptoms of cholecystitis are relieved by a course of treatment consisting of the daily use of glyceryl trinitrate to relax duodenal spasm. SAMUEL H. KLEIN, M.D

Allen, A. W., and Wallace, R. H.: The Surgical Management of Stone in the Common Bile Duct. *Ann. Surg.*, 1940, 111: 838.

Comparative data are presented on groups of patients with biliary-tract disease who have been subjected to common-duct exploration, in an attempt to determine the effects of instrumentation of the papilla of Vater. The authors set out to ascertain the effects of gradual dilatation of the papilla, and to evaluate the dangers of immediate infection from reflux of the duodenal contents, of the precipitation of acute pancreatitis, and of the production of a false passage. They also attempted to determine the effect of the immediate hemorrhagic reaction, the temporary reactionary edema, and the late cicatricial contraction, as well as the effect of a permanently destroyed sphincteric action on the digestion; and the possibility that such an outlet is conducive to a future ascending cholangitis.

The comparative statistics on 1,228 patients operated upon for disease of the extrahepatic biliary system from 1930 to 1935, and 860 patients operated upon from 1935 to 1939, made it apparent that there is safety and rationale in routine, gentle, gradual dilatation of the duct outlet. Gradual dilatation carried out with malleable dilators in the manner suggested by the authors does not increase the mortality. In fact there were more infections, prolonged biliary drainage, and longer hospitalization in those patients who had no dilatation of their papillæ.

The amount of dilatation, of course, varies greatly and depends upon the size of the duct and the size of the stones found in the gall bladder or in the ducts. The papilla alone should be dilated, and no attempt should be made to stretch the size of the duct itself. It has been found that most papillæ can be dilated to about 7 mm.

Of 266 operations on the biliary tract, 59.7 per cent were duct explorations, and stones were found in 61.6 per cent of the ducts explored, or in 36.8 per cent of all cases operated on for biliary-tract disease.

Pulmonary complications were more frequent in those patients in whom dilators had been passed through the duct outlet, than in those who had had no instrumentation. This may be a coincidence, but one must accept the fact that the added time consumed may be of significance. Also, there were 4 deaths from bile peritonitis in the group of patients who had had dilatation and none in those who had not been dilated. The authors suggest that the duct should never be sutured without adequate drainage to the outside. This should be accomplished by means of a tube sutured into the duct, as well as by drains placed in the dependent area of this region. There was 1 case of duodenal reflux which cleared up spontaneously in twenty-one days.

Late complications did not occur in this series. Apparently the sphincter is not destroyed when dilatation is carried to or just under the size of the average duct. Even when transduodenal exploration was necessary and the sphincter had been incised to remove a stone, there was no evidence of subsequent cholangitis or serious digestive disturbance. Late cicatricial contraction of the papilla following instrumentation did not occur. This was proved by secondary operations, performed for stones, in which some papillæ permitted the same size dilators that had been passed at previous operations, and a few were instrumented with even greater ease than at the first operation. However, the authors doubt the permanence of the dilatation in the average case. In very large ducts with dilatation carried to 1 cm., the sphincteric action may be lost. Under these circumstances, it does not seem to have interfered with the health of the patient. HAROLD LAUFMAN, M.D.

Morton, J. J., and Widger, S.: The Diagnosis and Treatment of Acute Pancreatitis. *Ann. Surg.*, 1940, 111: 851.

Not only is the diagnosis of acute pancreatitis difficult and unsatisfactory by ordinary clinical methods, but accurate diagnosis of the different pathological types is rare. With this problem in mind, the authors decided to make use of some special test for pancreatic dysfunction. After reviewing the various tests advocated in the past ten years, it was decided that the amylase test was most constant and satisfactory for the measurement of pancreatic activity.

Somogyi's amylase method was therefore adopted. This test is easy to do and has been proved more accurate than any of the others. Normal values range between 70 and 200.

Of 12 cases showing significant elevations of the blood amylase, 9 came to operation. Seven showed evidence of pancreatitis, and in those with higher amylase levels the edema was marked. Of the 2 other cases, one presented an extensive carcinoma of the right upper quadrant, and the other a common-duct stone with marked edema over the common duct, and the pancreas normal to palpation.

In the severe, hemorrhagic, necrotic forms of pancreatitis, it is claimed that the blood-amylase test shows elevated values only for a transient period. The authors have had no experience with this type. It is suggested that when paracentesis is done, the amylase test on this fluid may be diagnostic.

As to treatment, drainage is advocated for pancreatic abscess. In the acute, fulminating, hemorrhagic, necrotic type, the pancreas should be disturbed as little as possible, drains being placed against its surface. The pancreas cannot be drained

by splitting the capsule as formerly advocated, because the organ is crisscrossed by connective-tissue partitions so that it is made up of many separate chambers.

Incision into the pancreas leads to hemorrhage and necrosis, which is damaging. The purpose of drainage is to establish sinuses and to wall off the general peritoneal cavity from the extension of the secretions. Necrotic tissue can be extruded along these same drainage tracts.

In the milder forms of acute pancreatitis, as represented by the edematous type, the amylase test is most useful in following the course of the disease. There is a tendency for this form to subside in most instances. After the subsidence of the attack, exploration of the common duct with drainage for some weeks is all that is found necessary to cure this condition.

Because elevated amylase readings are found in acute parotitis as well as in acute edematous pancreatitis, and because parotitis shows such a remarkable response to small roentgen-ray treatments, it is suggested that these treatments might be of value in acute pancreatitis.

The authors' results seem to be satisfactory with 50 and 100 roentgen units measured through two portals in air until a total of from 250 to 450 roentgen units are given, and this mode of therapy is offered as a new means of shortening attacks of pancreatitis by putting the gland at rest.

HAROLD LAUFMAN, M.D.

Beling, C. A.: Calcification of the Pancreas. *Am. J. Digest Dis.*, 1940, 7: 231.

Approximately 140 cases of pancreatic lithiasis have been reported in the literature since the first description by De Graaf in 1664. Of these, 12 exhibited disseminated calcification of the gland. The first example of this type of calcification was reported by Allen in 1903. A résumé of these cases and a detailed report of the author's case is given.

The author's case was that of a man who had had repeated attacks of acute pancreatitis, which preceded the deposition of calcium in the pancreas. Sharp, gnawing, low epigastric pain, radiating through to the back, accompanied each attack, and the intervals between attacks were symptom-free. Important factors in the cause of the episodes of acute pancreatitis in this case were excessive indulgence in alcohol and repeated attacks of acute gastritis. X-ray examination revealed a penetrating duodenal ulcer in addition to the disseminated calcification of the pancreas. The latter was portrayed as a large number of miliary calcific shadows.

The absence of diabetes mellitus in the presence of advanced parenchymal calcification of the pancreas corresponds to the findings in earlier cases of this condition, and indicates no widespread involvement of the islands of Langerhans.

The author calls attention to the difference between pancreatic lithiasis and disseminated parenchymal calcification of the pancreas.

SAMUEL H. KLEIN, M.D.

GYNECOLOGY

UTERUS

Cusmano, L.: Comparative Anatomical Studies on the Fine Vascularization of the Uterus (Ricerche anatomocomparative sulla fine vascolarizzazione dell' utero). *Ginecologia*, Torino, 1940, 6: 251.

Cusmano has studied the distribution of the blood vessels in the uterus of certain mammals (the cow, pig, goat, cat, dog, rat, and guinea pig) and presents a general view of the behavior of the vessels in this organ.

The collaterals of the uterine artery, after penetrating into the uterus, give rise to branches which follow the longitudinal axis of the organ: these branches are located between the external longitudinal muscular layer and the internal circular muscular layer. In the pig only are all the large vessels (arteries and veins) found in the mucosa. The arteries located between the two muscular layers emit external collaterals for the external muscular layer and internal collaterals for the internal muscular layer; these collaterals give rise to the capillaries which are distributed between the muscular fibers, the course of which they follow. This arrangement of the vessels is common to all cases with the exception of the pig in which, on account of the presence of the large arteries in the body of the mucosa, the external collaterals are distributed to the two muscular layers, while the internal collaterals go to the mucosa; the external collaterals passing through the circular muscular layer give rise to precapillaries and capillaries in this layer and pass on to the external muscular layer in which they divide into capillaries which run parallel to the longitudinal muscular fibers. The branches intended for the mucosa originate: either (a) from the internal collaterals which, deriving directly from the large arteries, run through the internal muscular layer, in which they give rise to a capillary network, and penetrate into the mucosa; (b) or as in the cow, from a vascular plexus which is formed between the muscular layer and the mucosa by the internal collaterals and from which the arterioles for the mucosa detach themselves. Consequently, two capillary networks are developed in the mucosa, one in its deep portion and the other in its superficial portion.

In short, there are four capillary networks in the uterus, i.e., one for the external muscular layer, one for the internal muscular layer, and two for the mucosa. From these capillary networks are formed the small venous branches, all of which run to the large venous sinuses of the muscular layer and which represent therefore the first stage of the return circulation. In the majority of the cases examined by the author, these large sinuses are found together with the arteries between the external and the internal muscular layer and constitute what is known as the vascular layer. In the pig only are the large venous sinuses together with the arteries found in the body of the mucosa, while in rodents the sinuses occur more easily between the internal muscular layer and the mucosa, being thus separated from the large arteries which are always located between the two muscular layers. However, this arrangement is not constant because venous sinuses are also found in the vascular layer. Therefore, it may be stated that in rodents it is possible to find the first stage of the return circulation either between the two muscular layers or between the muscular layer and the mucosa. The venous sinuses then communicate with the periuterine venous plexus from which the uterine veins originate.

RICHARD KEMEL, M.D.

ADNEXAL AND PERIUTERINE CONDITIONS

Stabler, F., and Thomson, J. G.: Granulosa-Cell Tumor with Precocious Sexual Development in a Child Aged Six. *J. Obst. & Gynaec. Brit. Emp.*, 1940, 47: 199.

This case report deals with a girl of six, first examined in June, 1938. In November, 1937, the mother had recognized enlargement both of the breasts and of the abdomen; shortly afterward it was discovered that the nymphæ were unusually well developed. Vaginal bleeding started about this time; it was free and continued for three weeks. Further vaginal bleeding occurred in February 1938, again in April, and bleeding had been present for eleven days when she was admitted to the hospital on June 13.

The pertinent physical findings included breast development corresponding to an age past puberty, fine dark, sparsely distributed pubic and axillary hair, up to ½ in. in length, and the external genitalia were developed as in an adolescent. The abdomen was protuberant because of a firm, smooth, rounded tumor rising out of the pelvis and extending just above the navel. X-ray films showed normal epiphyses.

On June 18 an endometrial biopsy was taken and the endometrium was found to be hypertrophied. The pelvic mass was a tumor of the left ovary; it was removed. The opposite ovary apparently was infantile.

The tumor weighed 715 gm.; it was solid and there were no areas of hemorrhage, degeneration, or necrosis in it. Microscopically it was formed of solid columns of cells of an epithelial type which were separated by fine connective tissue. The cytoplasm of the tumor cells was finely vacuolated; the tumors contained innumerable tiny droplets of fat. The endometrium consisted of slightly dilated glands lined by tall columnar cells; the stroma cells were round or oval and were packed together rather closely.

The effects of the operation were striking. Uterine bleeding stopped after six days and has not recurred during the ensuing year. The breasts showed definite regressive changes after two months and continued to regress for six months. The pubic and axillary hair was replaced by fine, fair down that is hardly perceptible. The enlargement of the clitoris and labia became much less marked but the nymphæ remain larger and more protruding than usual. The involution of the external genitalia and the breasts appeared to cease about six months after removal of the tumor.

Before operation there were approximately 2 international units of estrin in 40 c.cm. of blood; two months later there was less than 1 unit. Before operation there were 5 international units of combined estrin and 4 international units of free estrin per liter of urine; two weeks after operation there was less than 1 unit of combined estrin per liter of urine, and two months later none was demonstrable.

The authors comment on the difficulties encountered in deciding from clinical and anatomical observations alone whether tumors are producing luteal hormone or estrin; hormonal studies must be the deciding factors. A high lipoid content of tumor cells does not necessarily indicate that they produce progestin. GEORGE H. GARDNER, M.D.

MISCELLANEOUS

Averett, L.: The Advantages of Vaginal Approach to Pelvic Pathology. *Am. J. Obst. & Gynec.*, 1940, 39: 776.

This study is based on an experience with 1,060 patients operated upon by the vaginal approach.

Vaginal section was found to be superior to abdominal section in that it carried a lower mortality and morbidity rate. There were 3 deaths in the series, a mortality rate of 9.28 per cent. The character and extent of the pathology were on a par with those which may be seen in any similar number of patients operated upon in any exclusively abdominal clinic.

The author used spinal anesthesia almost exclusively, with both safety and satisfaction, in all abdominal and pelvic surgery. Most of the operations were done under spinal anesthesia, without an anesthetic death, or any morbidity traceable to the anesthetic.

There were 21 separate indications for operation which were met by 1,060 primary and 1,225 additional operations, or a total of 2,285 operative procedures.

In the cases of 24 ectopic pregnancies, operation was successfully performed through the vaginal route. Non-neoplastic uterine bleeding during, or close to the time of, the menopause was the indication for operation in 129 patients. Vaginal hysterectomies were done in all of these, with or without the preservation of the ovaries, the age of the patient and the ovarian activity being the deciding factors.

In the discussion, NICHOLSON said that the convalescence from abdominal hysterectomy in good hands is so simple that it is inconceivable why anyone should attempt to perform this operation by any route except that of the abdomen. He stated there was no question that in rare cases vaginal hysterectomy has its place, but that the vaginal approach to pelvic inflammatory disease, ovarian cysts, or ectopic pregnancy is entirely unjustifiable.

EDWARD L. CORNELL, M.D.

Pierra, L. M., and Erlande, G.: Gynecological Significance of the Male Hormone (La place de l'hormone mâle en gynécologie). *Rev. franç. de gynéc. et d'obst.*, 1940, 35: 97.

In 1924 Pierra and Jouve presented a monograph on the heterologous hormonal effect of a protein extract of the male sex gland. This extract, since known as "androstine," was demonstrated as having both an inhibitory and a stimulating effect upon the ovarian function, i.e., a regulatory effect in functional genital disorders and in particular in sexual disorders. This regulatory effect is still being successfully used after fifteen years.

The testicular hormone, testosterone, has an entirely different action. It has been shown to exert an inhibitory effect upon the female sex hormones. An attempt has been made to compare this effect with that of other well known inhibiting hormones, such as corpus-luteum and mammary-gland hormones and hormones from the posterior lobe of the hypophysis.

After briefly reviewing the results of animal experimentation with testosterone, the writers report their own results with testosterone propionate in four types of cases. These included ovulation crises, premenstrual mammary congestion, and uterine and chronic mastitis, all having in common a functional hyperactivity of the ovaries.

In a number of patients presenting congestions characteristic of the period of ovulation, testosterone propionate was administered in 3 or 4 doses of 10 mgm. each, by injection on the days preceding the attack when this could be foretold, usually between the ninth and thirteenth days of the cycle. If the date of attack could not be foretold, 10 or 20 mgm. of the testosterone propionate were injected at the onset of pain or first signs of hemorrhage. In all, 12 cases were treated, with negative results in 8, doubtful results in 2, and satisfactory results in only 2 cases. As these results could not be regarded as encouraging, the method was discontinued.

It has been suggested that an excess of folliculin may induce mammary reactions leading to adenoma or even to adenocarcinoma. Inhibitory treatment is therefore indicated. The authors agree with Desmarest regarding the indications for the use of this hormone, not only in simple premenstrual congestion without anatomical basis, but also in glandular nodosities or more or less extensive cysts (Reclus' disease); however, they use a slightly different technique. In the first place, they use testosterone

propionate, not acetate, in doses of 10 mgm. per injection. Injections are commenced between the eleventh and fifteenth days of the cycle and repeated every two days, 5 or 6 injections being given, in accord with the duration of the cycle in the individual case. The treatment is always discontinued at least five days before the expected period in order to avoid the risk of interruption of the cycle. In all, 14 cases were treated. Of these, 9 presented simple premenstrual congestion of varying degree. Persistent chronic mammitis was present in 4 cases with premenstrual swelling. The treatment proved a failure in 3 cases, in 2 of which the obesity of the patient may have been a factor. All the other patients benefited by the treatment and often very rapidly. Constant observation is necessary in these cases in order to establish new therapy based on the changes obtained.

In fibroma of the uterus the authors made use of testosterone acetate. The doses varied from 40 mgm. (4 injections of 10 mgm.) to 200 mgm. (5 injections of 40 mgm.). As in the mastopathies, the injections were administered between the eleventh and twentieth days of the cycle, and, as a rule, every other day. Of the 11 cases treated, 2 presented multiple subperitoneal fibroma, 4 intramural fibroma, and 5 submucosal fibroma; 2 produced abundant and continuous menorrhagia. The results of treatment in the 7 cases presenting menorrhagia were very satisfactory and often very prompt. Frequently the quantity and duration of the menses were diminished after the first series of injections. The hemostatic properties of testosterone appear unquestionable.

The question is brought up, however, as to whether the new hormone may check the development of fibroma or cause its regression once the tumor is present. Desmarest is of the opinion that it may. The experience of the present writers is too recent to permit of conclusions. In 3 cases they had the impression that the tumor had diminished in size. In 8 other cases they believed that the hormone had inhibited the development of the tumors, which remained stationary after treatment. It is emphasized that the growth of fibroma is most irregular and capricious.

It is concluded that testosterone propionate is the treatment of choice for all mastopathies except malignancy. For the present, testosterone acetate must likewise be regarded as the treatment par excellence for fibroma, particularly in women under forty years of age, and for fibroma of small and medium size. EDITH SCHANCHE MOORE.

Abarbanel, A. R.: The Percutaneous Administration of Testosterone Propionate for Dysmenorrhea. *Endocrinology*, 1940, 26: 765.

The percutaneous administration of testosterone propionate has been shown to relieve dysmenorrhea and premenstrual tension. It involves at least two cardinal considerations. These are the nature of the vehicle and the concentration of hormone per unit volume. Sesame oil proved to be a more efficient vehicle than the ointment base used. Provided the total dosage remains the same, the greater the concentration of hormone per unit volume, up to a certain maximum, the greater the effective absorption.

The indications for percutaneous administration of testosterone propionate for dysmenorrhea with or without premenstrual tension are objection to parenteral therapy, maintenance therapy for residual symptoms after parenteral administration, and when parenteral therapy is unavailable. Each patient should be strongly urged to receive injections first in order to determine the response to testosterone propionate; the amount necessary for percutaneous administration may thus be gauged.

Dose for dose, the subcutaneous route is the most efficient method of administration. The intramuscular route is from one-half to two-thirds as effective. Testosterone propionate is from one-third to one-sixth as effective when given percutaneously as when given by the subcutaneous route. Orally, combined with bile salts, it is about one-seventh as effective as when given subcutaneously. From a practical viewpoint, however, the percutaneous method is much more economical than parenteral therapy and so is preferable to the patient.

No signs of masculinization were ever noted. The only possible sign of defeminization was the loss of nymphomaniac tendencies in one patient.

J. THORNWELL WITHERSPOON, M.D.

Hunter, G. W.: Transverse Abdominal Incisions in Pelvic Surgery. *Am. J. Obst. & Gynec.*, 1940, 39: 593.

Transverse abdominal incisions for pelvic pathology are not widely used in this country. These incisions are the safest and most logical approach to pelvic pathology when laparotomy is required.

Seven hundred cases of transverse incision are reported without 1 instance of postoperative hernia or evisceration.

The following advantages are stressed:

A. Almost complete absence of postoperative hernia and evisceration. Careful review of the literature reveals that these complications are essentially those of unphysiological incisions, that is, incisions other than transverse.

B. Better scar. Incisions should be made along Langer's lines of skin cleavage.

C. Adequate exposure. The Pfannenstiel incision can be used in a preponderant number of cases and when one is familiar with this incision, he can usually get adequate exposure. The Maylard or Bardenheuer incision will give adequate exposure for any pelvic operation.

D. Better blood supply to the wound with consequent better wound healing and lower incidence of wound infection.

E. Less tendency toward adhesions. Some factor other than imperfect closure is responsible for the high incidence of adhesions following the longitudinal incision.

F. Absence of lateral tension to wound.

G. Diminished morbidity and mortality with a shorter hospital stay and earlier return to physical work. EDWARD L. CORNELL, M.D.

Cary, W. H.: Experience with Artificial Impregnation in Treating Sterility: A Report of 35 Cases. *J. Am. M. Ass.*, 1940, 114: 2183.

In a series of 35 consecutive and unselected individuals in whom artificial impregnation was employed, there were 12 pregnancies. In the cases of 17 women, with 8 pregnancies, the husband was infertile, and the wife was inseminated from one to six times with a donor specimen. In the 18 other cases, the uterus was instilled 37 times with the husband's specimen, following which there were 4 pregnancies.

The author frowns equally upon "curettage as the empirical panacea for sterility" and the undiscriminating use of glandular therapy. Likewise, he believes that the husband's specimen is too frequently injected into the uterus without sufficient understanding of the indications, technique, or the risks involved. Legal aspects of the problem should be investigated in each state. No more than one attempt was made to obtain pregnancy during one menstrual cycle, and the author believes that no more than 0.6 c.cm. of semen should be injected. The Sims position, with a Sims speculum for exposure, and the author's cannula, make the procedure not difficult. The specimen is usually procured in the office in a sterile dry jar. One male was thought to have a necrospermia until importation of the specimens in a rubber container was stopped. In women with normal cycles impregnations were attempted on the eleventh to the fifteenth days of the cycle, inclusive. In a woman with a twenty-four to twenty-six day cycle, impregnation was attempted on the eighth day.

The chief indication for using a donor specimen was hopeless azoospermia; in a few cases the husband had a high degree of seminal deficiency, unimproved by competent treatment. The indications for injection of the husband's specimen are rare, and most of the conditions which might suggest it, such as chemical or mechanical obstructions to the cervical canal, are correctible.

Local or systemic disease in either mate must be ruled out or properly evaluated before resort is made to artificial impregnation. Criteria on fertility in the female are not clear-cut, and endometrial biopsies and vaginal smears by Papanicolaou were used frequently. The successful inseminations were made on the following days of the menstrual cycle: 1 on the eighth, 3 on the eleventh, 2 on the twelfth, 1 on the thirteenth, 4 on the fourteenth, and 1 on the fifteenth.

John Hunter (about 1790) is usually given credit for the first successful employment of artificial impregnation; he transferred to the vagina the semen of a patient with hypospadias. The largest series in the human species, consisting of 88 cases with 33 pregnancies, was reported in 1927 by Schorohowa. E. S. BURGE, M.D.

OBSTETRICS

PREGNANCY AND ITS COMPLICATIONS

Mitra S.: Simultaneous Intra-Uterine and Extra-Uterine Pregnancy. *J. Obst. & Gynaec. Brit. Emp.*, 1940, 47: 206.

Mitra adds 2 cases of simultaneous intra-uterine and extra-uterine pregnancy to the world's literature to bring the total up to 306. The importance of this complication lies in the fact that sometimes one condition is overshadowed by the other, and the true diagnosis is made only at operation.

Simultaneous pregnancies are sometimes termed combined or compound pregnancies. It may be a type of twin pregnancy, one fertilized ovum reaching the uterus and the other staying in the fallopian tube. The uterine pregnancy may take its origin at the same time, the intra-uterine pregnancy may antedate the extra-uterine, or vice versa. A woman may also conceive in the uterus while carrying the products of an extra-uterine gestation.

In the author's first case a vaginal examination revealed a pelvic hematocele. At operation, in addition to the hematocele, the uterus was found enlarged and so densely adherent to the mass that it was thought best to remove it with the ectopic sac. Microscopic examination showed chorionic villi in the blood clot through the tubal rent and an intra-uterine fetus of about eight weeks' duration.

In the second case, operation revealed a ruptured ectopic gestation in the right fallopian tube. The uterus was found to be enlarged to about a three months' pregnancy. A diagnosis of intra-uterine pregnancy not being absolutely certain, the uterus was removed along with the ruptured sac. During its removal the uterus was found to be gravid.

The management of a combined pregnancy is entirely surgical. CHARLES BARON, M.D.

Amabile, G.: Enlargement of the Left Breast and of the Left Lobe of the Thyroid Gland Recurring During 4 Successive Pregnancies (Ingrossamento della mammella sinistra e del lobo sinistro della tiroide ripetutosi in 4 successive gravidanze). *Clin. ostet.*, 1940, 42: 157.

Amabile discusses the case of a woman, aged thirty-four years, who developed an enlargement of the left lobe of the thyroid gland immediately after her first delivery and, in addition, a great enlargement of the left breast during each of her 4 subsequent pregnancies. He has kept his patient under constant observation for fifteen months. As he was not allowed to take a biopsy of the breast to determine the exact anatomicopathological nature of the disorder, he had to limit himself to testing the reactions of the breast to functional stimulation or inhibition with various substances.

1. Injections of follicular hormone (oily solutions of 50,000 international units of progynon B, each) caused a marked enlargement of the swelling of the breast; the increase was 2 cm. in the vertical and 3½ cm. in the horizontal direction.

2. Injections of corpus-luteum hormone (oily solutions of 5 mgm. of proluton Schering, each) produced no change in the size of the breast.

3. Injections of Elityran Bayer caused a decrease of 1½ cm. in the size of the breast, both in the vertical and the horizontal directions.

4. Injections of testosterone propionate (testovirone Schering, 20 injections of 5 mgm. each) caused a marked decrease of the entire swelling; the decrease was 2 cm. in the vertical and 4 cm. in the horizontal direction.

5. The injection of 0.01 gm. of pilocarpine hydrochloride gave a result that may be regarded as practically negative, as the perspiration appeared on the right part of the chest, and especially in the axilla, about one minute before it appeared gradually on the left side. On admission, the patient stated that the swelling disappeared completely nine months after delivery; subsequent observation showed that this impression was erroneous.

The author feels justified in drawing the following conclusions from his experimental data:

1. The patient is suffering from a process of chronic mastitis which produces a chronic local stimulation.

2. She has an asymmetry of the tonus of the sympathetic innervation of the two sides and, therefore, an asymmetry of the trophism, whether connected with or independent of the unilaterality, of the thyroid lesion.

3. The hyperfolliculinemia, which is so characteristic of pregnancy, represents the ultimate factor which caused the hypertrophy of the breast, the localization on the left side having been decided by the two factors mentioned previously.

4. The decrease of the swelling within a limited time (about forty-five days), obtained by means of injections of testovirone Schering, allows the statement that this promising result can be explained by the inhibiting action of testicular preparations on the breast; this action was noted long ago on the basis of hypertrophy of the breast observed in a case of lack of development of the testicles and after interventions which compromise the function of the testicles. RICHARD KEMEL, M.D.

Liston, W. G., and Cruickshank, L. G.: Leucorrhea in Pregnancy: A Study of 200 Cases. *J. Obst. & Gynaec. Brit. Emp.*, 1940, 47: 109.

At the laboratory of the Royal College of Physicians, Edinburgh, among 200 pregnant women who were supposed to be suffering from leucorrhea, 40, or 20 per cent, showed normal vaginal contents characterized by the findings that pus cells were less numerous than epithelial cells, that the bacterial

flora consisted wholly of Doederlein's bacilli, that the pH of the vaginal contents lay between 4 and 5, and that glycogen was abundantly present in the epithelial cells.

Cervical lesions including erosions were present in 79 of the 200 patients, nearly 40 per cent. More than half of these cases were complicated by other causes of leucorrhea. There were, however, 31 patients in which the condition of the cervix was the possible explanation of the leucorrhea. The degree of departure from the normal characteristics of the vaginal contents in these cases depended to some extent on the severity of the cervical lesions, but this was not always the case. The more severe forms of cervical lesions were associated with abnormal features of the vaginal contents, for pus cells became more numerous, the bacterial flora tended to drift toward Types II and III, the hydrogen-ion value became higher, i.e., less acid, and glycogen was less abundant in the epithelial cells.

Gonorrhea accounted for only 4 cases of leucorrhea among the 200 pregnant women.

The parasite of vaginal thrush was found to be the cause of the leucorrhea in 49 cases, i.e., approximately 25 per cent. This infection is easily overlooked unless films are made from the white patches characteristic of the disease. The condition should be diagnosed by finding the hyphal filaments of the fungus. The blastospores of this fungus may be confused with yeast cells.

The parasite trichomonas vaginalis is by far the most common cause of leucorrhea in pregnant women; 75 cases were found (40 per cent). In all these cases pus cells preponderated over epithelial cells in the vaginal films, and the majority of the cases presented a bacterial flora of Type III. The pH of the vaginal contents lay generally between 5 and 6, the more acute cases nearer 6, the more chronic cases nearer 5. Recovery was associated with a change in the type of bacterial flora from III to I through Type II and a return of the pH to between 4 and 5. Glycogen was generally deficient in the epithelial cells. The condition was in some cases complicated by cervicitis or the presence of the thrush fungus or of the gonococcus.

Eight cases of the 200 could not be classified. Some of these patients showed a thin, watery discharge with numerous epithelial cells, comparatively few pus cells, large numbers of organisms of Type III, and a pH of about 6. No cause was apparent. One case of leucorrhea caused by trauma was in this group. CHARLES BARON, M.D.

Stander, H. J.: A New Classification of the Toxemias of Pregnancy. *Am. J. Surg.*, 1940, 48: 112.

Some years ago Kellogg wrote: "The conquest of the toxemias of pregnancy depends primarily on a universal acceptance in this country of some index, of some classification, some co-operative mode of study in every great obstetrical center."

Realizing the desirability of a uniform classification, the American Committee on Maternal Health, in 1937, appointed a committee, consisting of Mussey, Bell, Kellogg, Herrick and Stander, to study the problem and, if possible, to reach an agreement upon a simple, workable classification. It is hoped that maternity hospitals throughout the country will be willing to adopt the final grouping of the Committee. The following is the new classification proposed:

1. Hypertensive disease
2. Renal disease
3. Pre-eclampsia, severe; pre-eclampsia, mild
4. Eclampsia
5. Vomiting of pregnancy
6. Acute yellow atrophy of the liver
7. Unclassified

"Pre-eclampsia, severe" includes those cases which in most classifications have been termed "pre-eclampsia." "Renal disease" is an inclusive term comprising all cases of kidney disease or chronic nephritis of whatever type—chronic glomerulonephritis, arteriosclerotic nephritis (nephrosclerosis), or nephrosis (degenerative type of nephritis). Under "renal disease" should be indexed all patients in whom the past history, present symptomatology and signs, laboratory and chemical findings, such as kidney function, blood chemistry and eye-ground changes, indicate involvement of the kidneys.

Mild pre-eclampsia includes those patients suffering from a slight rise of blood pressure, some albuminuria, and, perhaps, edema during the latter part of pregnancy; in other words, the findings of pre-eclampsia, but to a limited extent. Shortly after delivery these abnormalities completely disappear and may not reappear in a subsequent pregnancy. In 1926, Stander and Peckham called this type "low reserve kidney;" it has been labeled: non-convulsive toxemia, hypertensive toxemia, hypertension of pregnancy, albuminuria of pregnancy, recurrent toxemia, and kidney of pregnancy. In 1937, Kellogg suggested the term "mild pre-eclampsia."

Hypertensive disease (hypertensive vascular disease, diffuse arteriolar disease with hypertension or essential and malignant hypertension), just as renal disease, is not a toxemia of pregnancy, but is included in the classification because it is so often first recognized during a pregnancy, is apparently accentuated by gestation, and simulates, in certain features, pre-eclampsia as well as renal disease.

In essential hypertension in man, the cardiac output as well as the volume and physical state of the blood are normal, whereas it is generally agreed that peripheral resistance is increased. The peripheral resistance in essential hypertension may be caused by morphological changes in the arterial vessels, or vasoconstriction of chemical or nervous origin. It may be that morphological changes, as well as chemical factors, play a rôle in the production of essential hypertension.

Hypertensive disease may antedate pregnancy, or may first appear during gestation. It is conceivable that pregnancy is a predisposing factor in the production of arteriolar changes resulting in hyper-

tension, which may become permanent in the form of an essential hypertension. The characteristic finding in this condition is an elevated blood pressure without any signs or symptoms indicative of renal involvement.

In the benign form of hypertensive disease, the blood pressure is usually not elevated to extreme degrees, no albuminuria exists, ophthalmological examination reveals only minimal changes in the vessels, and symptoms are commonly absent. In the severe forms, or malignant type, the retinal vessels show more marked involvement, and, finally, kidney function becomes impaired. Thus it is clear that from the benign form there is a transition to the malignant type, in which the condition sooner or later shows renal involvement.

In Stander's clinic this new classification has been employed since April 1, 1939 (Table I) and has

TABLE I.—INCIDENCE OF TOXEMIA—NEW CLASSIFICATION

108 Cases in 1,503 Pregnancies
From April 1, 1939 to September 30, 1939

Type of toxemia	No. of cases	Percentage of total
Vomiting of pregnancy	7	6.5
Acute yellow atrophy of liver	1	0.9
Eclampsia	4	3.7
Severe pre-eclampsia	7	6.5
Mild pre-eclampsia	51	47.2
Hypertensive disease	31	28.7
Renal disease	7	6.5
Total	108	100.00

proved simple and workable. The incidence of toxemia was about 7 per cent. Toxemia has accounted for 7.1 per cent (4 deaths) of the total maternal mortality in 30,457 patients (1932–1939).

DANIEL G. MORTON, M.D.

Caffaratto, T. M.: A Rare Case of Massive Expulsion of Decidua after Abortion at the Fifth Month (Un raro caso di espulsione massiva di decidua dopo aborto al V mese). *Ginecologia*, Torino, 1940, 6: 229.

A primigravida of twenty-six years in the fifth month of gestation was admitted complaining of labor pains. In spite of sedation, the pains increased in severity and frequency, and after a few hours she expelled a dead fetus weighing 600 gm. This was followed in a few minutes by the placenta which weighed 170 gm. Ten minutes later a pale red membrane was expelled, measuring 9 by 14 cm. and from 4 to 10 mm. in thickness. One side of this membrane was quite smooth, but the other presented numerous villi. On histological examination, it proved to be decidua in which there were two distinct zones, one characterized by interstitial infiltration by leucocytes and small cells, and the other showing signs of early necrosis with either dark nuclei or complete absence of them. The placenta was of the marginate type and also showed some leucocytic infiltration.

FRANK MCDOWELL, M.D.

LABOR AND ITS COMPLICATIONS

Ince, J. H., and Young, M.: The Bony Pelvis and Its Influence on Labor; A Radiological and Clinical Study of 500 Women. *J. Obst. & Gynaec. Brit. Emp.*, 1940, 47: 130.

The authors recorded the results of a detailed study of the architecture of the pelvis as revealed by roentgenography in a consecutive series of fully 500 women in the early stages of pregnancy who were attending the antenatal clinic of the University College Hospital, University College, London. They attempted, by correlation of the variations in the pelvic size and shape with subsequent obstetrical histories, to determine to what extent, if any, these variations influenced the presentation and position of the child and the mechanism of labor.

The average measurements of the true conjugate and greatest transverse diameters of the pelvic inlet in this series of London women were of much the same order, and the same variations were seen as in the corresponding diameters in Nicholson's series of women from rural Gloucestershire.

The estimates given in current textbooks of anatomy and obstetrics for the true conjugate diameter of the normal female pelvis are too small to be considered representative of the modern English woman and require revision.

The average pelvic brim index in English women is not platypellic (relatively flat index under 90 per cent), as has been maintained since the time of Turner, but falls into the intermediate or mesatipellic class, i.e., it shows an index of over 90 per cent.

The attempt to classify the shape of the pelvic brim merely by subjective impressions into 10 or 12 classes as suggested by Caldwell and Moloy is not only unscientific but results in a classification which is cumbersome and of no practical value.

Both the anteroposterior and transverse diameters, and consequently the estimated area, of the pelvic outlet in this series of women were definitely smaller than in the women from rural Gloucestershire, but the difference may be explained in part by a difference in the technique of measurement.

The intensity of the relation found between the various pairs of characters of the female pelvis is usually of a low order and presumably of little practical importance. The correlation coefficient, however, between the approximate areas of the pelvic inlet and outlet is as high as 0.5.

As the greatest transverse diameter at the pelvic inlet is fairly highly correlated with the intercristal diameter, and as the latter can be measured in the living subject by calipers with a high degree of accuracy, the average transverse diameter that would be found associated with a specified intercristal diameter may be predicted fairly satisfactorily, although the predicted value may diverge considerably from the actual diameter in particular cases. The external conjugate in the living can be measured much less accurately by calipers, and is definitely

less reliable for the prediction of the corresponding true conjugate diameter.

There was little, if any, evidence in this series of women of any relation between pelvic characters, including the shape of the inlet and physical characters expressive of the type of body build.

There was no conclusive evidence in the data that a male distribution of the pubic hair and hirsuties has any association with the presence of male tendencies in the female pelvis.

Of the pelvic characters brought under review the only two which seemed to have an influence in determining whether assistance in delivery by the forceps would be necessary or not were the size of the pelvic outlet and the size of the subpubic angle. In this series it was at the pelvic outlet that most of the difficulties arose.

Another factor of importance in determining whether delivery would occur spontaneously or not is the size of the child's head. Its influence is clearly shown in this series of women.

There was also evidence of a tendency of persistent occipitoposterior positions to occur in pelves which were relatively long in the occipitoposterior direction, i.e., the anthropoid type, although the shape of the pelvis could not be considered wholly accountable for this form of malposition.

As there was no evidence that minor variations in the shape of the pelvic brim had an influence on the course of labor, whereas there did seem to be a relation between the actual size of the pelvis and the possibility of a natural delivery, as much attention should be directed to the estimation of the pelvic width as to the measurement of the true conjugate diameter. Thus, there seem to be valid reasons for preserving the accepted classification into flat and generally contracted pelves rather than adopting the suggested types of Caldwell and Moloy, which rely too much on impressions of the shape of the pelvic inlet. CHARLES BARON, M.D.

Smith, E. F.: Transcervical Cesarean Section with Peritoneal Exclusion and Bladder Mobilization. *Am. J. Obst. & Gynec.*, 1940, 39: 763.

Through a Pfannenstiel incision the abdomen is entered by a transverse incision in the parietal peritoneum, following which the peritoneum over the lower uterine segment is cut transversely, loosened, and sewed to the parietal peritoneum, which creates an extra abdominal approach to the lower uterine segment. A transverse incision is then made in the lower uterine segment, through which the baby is delivered.

The author reports he has performed this operation 17 times, and that the mothers and babies are all alive. There were no serious postoperative complications. One patient remained in the hospital twenty-seven days because of mild pulmonary complications, but the others were there only from ten to sixteen days. Postoperative discomfort was absent in all cases, including 2 in which the patients had moderate distention. Seven patients were frankly infected. One had had numerous preoperative vaginal examinations, with two attempts at forceps delivery, yet she recovered uneventfully. In another patient the uterine artery was cut and sutured with no untoward sequelæ.

The technique affords a more roomy elastic area than any of the other exclusion operations and precludes the formation of postoperative adhesive bands. It eliminates the possibility of subsequent intra-abdominal hernia, minimizes trauma to the bladder, and preserves the nutrition of the peritoneum. It localizes the operative site so that the ureters and bladder are not jeopardized, and restricts the operation to the well-oriented lower peritoneal cavity, yet provides complete peritoneal exclusion. It is equally useful in infected and non-infected cases, and is not contraindicated by breech presentation, placenta previa, and other intra-uterine complications. EDWARD L. CORNELL, M.D.

PUERPERIUM AND ITS COMPLICATIONS

Cicchella, T.: Urinary Colibacillosis and Enterorenal Syndromes During the Puerperal Stage (Colibacillosi urinaria e sindromi enterorenali nello stato puerperale). *Arch. di ostet. e ginec.*, 1940, 4: 161.

Cicchella presents an extensive discussion of the literature on the etiopathogenesis, the symptomatology, and the treatment of colibacillosis in the various phases of the puerperal state and offers his observations on 90 personal cases of enterorenal syndromes and of pyelonephritis caused by the bacillus coli during pregnancy. The frequency of these cases amounted to 28.80 per cent of the admissions to the Obstetrical Clinic of Torre del Greco from January, 1938, to June, 1939. However, acute febrile cases are rare, as the ratio of evident to latent forms is 1 to 7. The greatest frequency of occurrence was found between the ages of twenty and thirty years, with the maximum between twenty-seven and twenty-eight years, during the second and third pregnancies, between the fifth and the seventh months of pregnancy, and during the late fall and the winter months. The acute febrile forms were observed especially during the puerperium and represented probably the acute episode of the subfebrile or latent forms present during pregnancy.

The clinical signs obtained by questioning the patients were in order of frequency: chills, pollakiuria (especially nocturnal), perspiration, abdominopelvic pain, gastro-intestinal disturbances, asthenia, and toxic manifestations of pregnancy. Chills, pollakiuria, and spontaneous abdominal pain were most frequently associated with and seem to be characteristic of the urinary localization of the colibacillosis during pregnancy, especially in the larval forms. Direct examination gave the following order of frequency for the points at which pain was elicited: the pelvic ureteral point of Bazy, the costomuscular point of Cova, the para-umbilical point, and the urethral point. By far the most frequent findings in the urinary sediment were leucocytes

with some red cells and epithelial cells; bacilluria was not often observed, but in several cases there were numerous crystals of calcium oxalate. Culture of the urine was positive in 47.7 per cent of the cases; however, the cytological findings in the urinary sediment should be accepted as sufficient support for the positive symptomatological picture, and the negative results of the culture should not lead to neglect of treatment. Persistence of bacilluria or of positive cultural results has been noted in several cases that were clinically cured by the treatment; this excludes the concept of bacteriological cure and shows the possibility of recurrence of the condition.

The treatment consists essentially of urinary disinfection. In cases with marked manifestations, such as putrid fermentation or diarrhea, complementary vaccine treatment by mouth with lysates of bacillus coli was also used with good results. As urinary disinfectants, the author employed at first urotropine preparations and later the derivatives of mandelic acid as they became available in Italy. He has had no occasion to use sulfanilamide preparations. In some mild cases, he has administered orally 2 or 3 times a day 40 cgm. of urotropine associated with 15 cgm. each of camphoric acid and sodium benzoate. However, in most cases he has given commercial preparations of urotropine intravenously and has obtained good results; the acute febrile cases of the puerperium responded even better and more rapidly than the chronic or febrile cases, the fever disappearing after the first or at most the third or fourth injection. The only disadvantage is the possibility of renal congestion, which can be overcome by suspension of the injections and the administration of an alkalizing and diuretic treatment for a few days. However, in general the kidneys stand the treatment well.

The author has also employed ammonium mandelate. It acts well in subacute and chronic forms. Associated with sodium acid phosphate, it acts well in cases with predominance of nervous and toxic symptoms and in oxalemic syndromes. It is less efficient in acute febrile cases. Gastric intolerance is rare. Unfortunately, the special diet on which mandelic therapy is based cannot be used in pregnancy, and this may impair the benefit to be derived from the treatment. As a rule, the colibacillary manifestations reappear on suspension of the treatment, each cycle of which should not exceed from ten to fifteen days. Urine cultures remain positive even after protracted treatment which has resulted in clinical cure. Ammonium mandelate has no injurious action on the renal function which, however, should be intact before the treatment is instituted. Supplementary acidification with ammonium chloride was unnecessary because most of the cases already had an acid urine. RICHARD KEMEL, M.D.

NEWBORN

DeCosta, E. J.: Spontaneous Pneumothorax of the Newborn Infant. *Am. J. Obst. & Gynec.*, 1940, 39: 578.

The literature on the subject of pneumothorax of the newborn infant is reviewed; 67 cases have been collected and studied. Of these, only 46 have been directly associated with birth. Two additional instances at the time of birth are reported, one unique in that subcutaneous emphysema and pneumoperitoneum were also present. There appear to be two clinical types of pneumothorax in the newborn infant; one arising suddenly, pneumothorax abrupta, demanding prompt treatment; the other more gradual and less severe, pneumothorax lenta, with good prognosis irrespective of treatment. Resistance to the flow of air through the tracheal catheter during insufflation is suggestive of pneumothorax. The danger of producing pneumothorax by improper insufflation is stressed. Pneumothorax is a condition that probably occurs much more frequently than the literature indicates. Obstetricians should be mindful of its possibility, especially when any method of artificial respiration has been employed.

In the discussion 4 more cases were detailed. One infant died. EDWARD L. CORNELL, M.D.

THE HORMONAL TREATMENT OF BENIGN ENLARGEMENT OF THE PROSTATE

Collective Review

WILLIAM E. LOWER, M.D., F. C. SCHLUMBERGER, M.D., and E. E. FERGUSON, M.D.
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INTRODUCTION

THE symptomatology of enlargement of the prostate gland, which so frequently occurs in men past fifty years of age, has been recognized from time immemorial. Mention was made of the prostate as early as 1563 by Nicola Massa, and about the middle of the sixteenth century brief reference was made by Riolanus to obstruction at the neck of the bladder caused by swelling of the prostate. It is of interest that the first attempts to correct this disease of the prostate were made by way of the urethra rather than by open operation.

In 1834, Guthrie (33) introduced for the division of the median bar at the neck of the bladder a catheter carrying a concealed knife. Mercier (57) in 1837 devised special instruments called prostatatome and prostatectome. Bottini (5) introduced an electrocautery operation for correction of bladder-neck obstruction. Freudenberg (30) improved upon this instrument in 1897, and Young's (93) punch instrument, developed later, was a modern refinement of these earlier instruments.

Early in the nineteenth century there was also developed, perhaps because of inadequacy of transurethral methods, perineal prostatectomy by Sir William Ferguson (94). In 1891 Goodfellow (94) performed a similar type of operation. Development of the suprapubic route followed very soon. There has been considerable controversy as to who truly placed the suprapubic method before the profession. Belfield (94) in 1886 did his first suprapubic removal of the prostate. However, many attribute the introduction of this procedure to McGill (94) of Leeds; Freyer (94) also makes claim to being the first to remove totally the prostate by the suprapubic route. However, probably the most valid claim of priority is that of Fuller (94) of New York who, it is said, performed the first total prostatectomy suprapubically.

Enthusiasm for prostatectomy by the perineal route was again kindled in 1901 by Ferguson and Albarran (94); Murphy (94), in 1902; Young and Senn (94), in 1903. The open operation by either the suprapubic or perineal method was in vogue for many years. However, as newer mechanical methods were developed, a renewed interest was evidenced in a treatment of this disease through the urethra.

In 1911 Young (92) perfected an instrument which embodies the principles of the early Mercier punch. Stevens (77) in 1913 used a controlled electrocoagulating instrument. The cold-punch principle was again improved upon by Braasch (6) and McCarthy (48) with a direct vision scope. Caulk (14) in 1920 employed a similar principle but introduced the cautery blade in place of the cold knife. The development of intricate lens and mirror systems then brought the Stern (76) resectoscope into use in 1926. Davis (21) improved upon Stern's scope and spark-gap generator, and in 1931 McCarthy brought out the resectoscope with the cautery loop. Braasch and Thompson several years ago again employed the cold knife principle in a new instrument. In this manner the transurethral method of resecting the prostate has developed during the past few years. This procedure has been utilized by many surgeons, some with good results and others with poor results. Any surgical procedure always carries with it a percentage of mediocre results and a certain risk, and perhaps it is these factors which provide the impetus for investigation resulting in better methods of treatment.

Benign enlargement of the prostate has long been recognized as a disease of old men. Therefore, it manifests itself clinically at an age which sometimes is referred to as the male climacteric. We may then assume that perhaps benign enlargement of the prostate is associated with the hormonal changes which occur at that time. The testicle was first shown to possess an internal secretory action by experimentation with transplantation studies by Berthold (3) in 1849. In 1889, Brown-Sequard (8) based his ideas of internal secretions largely upon the rejuvenating effects he observed on himself following injections of dilute saline extracts of testis tissues. Actual

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extraction, concentration, and isolation of these hormones was much delayed. Real progress in the development of hormonal control of benign enlargement of the prostate has come only since 1926, and even more so since 1931 when the first successful methods of extraction were introduced.

Experiments and observations have led us to believe that prostatic hypertrophy can no longer be regarded as a surgical entity alone. The interrelationship between the anterior pituitary gland, testes, and secondary sex organs in lower animals is now clearly recognized, and such an association may also exist in man. We must, therefore, assume that benign enlargement of the prostate may be due to an endocrine disorder.

Following a brief synopsis of the experimental work which led to the establishment of these facts, we propose to review and evaluate the results obtained from the clinical application of these hormones in the treatment of benign enlargement of the prostate.

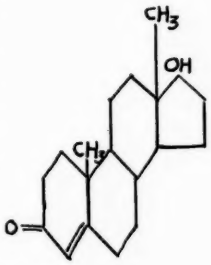
Hormonal Control of Changes in the Prostate

A. Effect of the Male Hormone

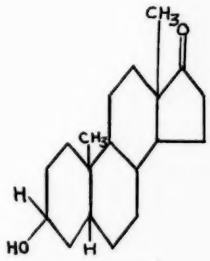
It has been definitely established that the castration of a young animal prevents the mature development of the accessory sex organs and that the secondary sex characters fail to make their appearance. Transplantation of the excised testicular tissue into another part of the animal's body prevents the occurrence of these castration effects.

These results of castration and transplantation experiments leave no doubt that the testis is a gland of internal secretion. It was Berthold (3) in 1849 who made the first experimental approach to the study of the function of the testes when he showed the effects of castration on cocks and also demonstrated that if testicular transplants became vascularized in the abdomen of these capons, the male sex characteristics were preserved. Leydig (81), von Ebrer (81), and Kolliker and Hofmeister (81) established the existence of the tubular portion and also of the interstitial cells in the testis. Pezard (67), in 1918, began experiments with testicular extracts, using the cock's comb as an indicator.

McGee (55) (1927) obtained an active lipoid extract of bulls' testes. In 1929 Loewe and Voss (43), and Funk, Harrow, and Lejwa (31) prepared extracts from male urine similar to those of testicular extracts. The active principle in these extracts was isolated in 1931 by Butenandt (10) who termed it *androsterone*. In 1934 and 1935



Testosterone



Androsterone

Ruzicka (70) synthesized androsterone from cholesterol. It was in this year, also, that David, Dingemanse, Freud, and Laqueur (20) isolated a crystalline substance, strongly androgenic, from bulls' testes, and called it *testosterone*.

Testosterone was synthesized from cholesterol in 1935 by Butenandt (11) and Ruzicka (71) at practically the same time. Like androsterone, it is a steroid. These compounds are characterized by a ring system consisting of three benzol rings arranged in a manner known from phenanthrene and a ring with only five carbon atoms. This chemical skeleton also forms the basic structure for cholesterol, ergosterol, the bile salts, and the female sex hormones.

Androsterone was found to be much less active than testosterone (from one-seventh to one-tenth). These compounds, having the qualities of an alcohol, are able to form esters. Esters of these steroids were first prepared by Miescher (58), who showed that the *propionate of testosterone* had a more pronounced and persistent action than did the free testosterone, although the maximum effect was obtained later. This effect is due probably to the fact that after absorption the ester is slowly metabolized with the formation of the free hormone, the same effect being produced as follows the frequent administration of hormone.

Following McGee's (55) work in 1927, Moore, Gallagher, and Koch (59) demonstrated, among other effects, the prevention of the atrophy of the accessory male organs (seminal vesicles, prostate, and Cowper's glands) by the use of testicular extracts in the castrated guinea pig, rat, or mouse. In 1930 Moore, Price, and Gallagher (61) showed that with injections of male hormone a normal rat prostate could be regenerated in twenty days, after the animal had been castrated ninety days previously. McCullagh, Cuyler, and Frawley (51) (1932), working with male hormonal extracts extracted from urine, which they termed "*andrctin*," found that they were able to control the atrophy

of the prostate gland in a rat. These workers also found that injections of androtin into a normal animal over a period of time caused a definite enlargement of the prostate. Numerous other workers have also established the fact that injections of male hormone cause rapid growth in the size of the prostate in immature or non-castrated animals. Zuckerman and Parkes (97) believe the action to be on the fibromuscular stroma and glandular elements. The uterus masculinus was not affected.

However, the pathological physiology is not as clear as the normal physiology. As early as 1893, White (89) suggested castration for the treatment of benign prostatic enlargement of the human being because of the belief, prevalent then, that the uterus and prostate were homologous. At this time oophorectomy was being employed in the treatment of fibromyoma uteri. In 1895 White (90) reported a marked reduction in size of the prostatic enlargement in 87.2 per cent of the cases subjected to bilateral castration. Soon after this, numerous surgeons reported cases of benign enlargement of the prostate which were relieved or cured by castration.

On the other hand, many workers found that although some showed improvement following castration, the majority of the patients had very little benefit. Deming, Jenkins, and von Wagenen (25) in 1935 demonstrated that an adenoma of the prostate did not reduce in size nor did the clinical symptoms disappear over a period of one month following double castration. Later these same workers (26) presented the case of a seventy-four-year-old man who had developed benign enlargement of the prostate fifty years following castration.

B. EFFECT OF THE FEMALE SEX HORMONE

In early reports, Lacassagne (40), Korenchevsky and Dennison (38), Zuckerman and Parkes (98), Burrows (9), DeJongh (23), and others put forth the theory, based on experimental animal work, that benign enlargement of the prostate was the result of changes produced by estrogenic substances.

These workers, experimenting with rats, found that at first there was a reduction in the number of glands in the dorsal lobe of the prostate, and an increase in the fibromuscular stroma. The epithelial cells then multiplied and a metaplasia with stratification of the epithelium occurred. Zuckerman (98), working with monkeys, confirmed their work and reported that if testosterone propionate was given with the estrone, these changes were prevented. Reports from other workers conflict with the above. Weller, Oberholser, and Nelson (88) (1926), and Moore and Price (60) (1932) obtained a decrease in the size of the prostate with the prolonged administration of estrone. They were of the belief that this resulted partly from the direct action of the estrogenic substance on the prostate, but more probably because of the suppression of the activity of the anterior pituitary body. Korenchevsky and Dennison (39) (1935) reported a decrease in weight of the non-castrated rat prostate after the administration of estrin, as well as hypertrophy of the adrenals and hypophysis. In the castrated rat, however, the authors noted an increase in fibrous tissue and an epithelial metaplasia. These changes were also noted in some of the secondary sex organs. Von Wagenen (85) and Zuckerman and Parkes (98) (1936) did not find metaplasia in the true prostate glands of monkeys during the prolonged administration of estrone. The chief effect of the estrogenic substance was a stratification of the epithelium of the ducts, the accessory seminal vesicles, and the lower half of the prostatic urethra.

Del Castillo and Pinto (24) (1937), working with rats, found that small doses of estrone caused atrophy of the prostate and testicles but larger doses over a shorter period produced an increase in the weight of these two organs. If testosterone were added to the latter doses, the prostate became even larger. Geschickter (32) (1937) also believed the effect of estrin on the monkey prostate varied with the dosage. He found that moderate doses produced a slight enlargement by an increase in the fibromuscular stroma, whereas large doses decreased the size of the prostate apparently through pituitary suppression.

Vidgoff (83) (1939) states that it is well known that estrogenic substance is a general epithelial stimulant.

C. EFFECT OF THE PITUITARY GLAND

It was demonstrated by Smith and Engle (74), as early as 1927, that following hypophysectomy there is atrophy of the prostate which can be completely repaired by reimplantation or the injection of pituitary substance. Walsh, Cuyler, and McCullagh (86) showed that this atrophy could also be prevented by the parenteral administration of male hormones. Smith and Engle (75) also demonstrated an increase in the size of all the male reproductive organs except the testis in young rats and mice after the implantation of pituitary-gland tissue. Moore and Price confirmed these results in 1931.

In the early experiments on rats, Brouha, Hinglais, and Simmonet (7) (1930), Lower and

Johnston (46) (1931), and Zondek (95) (1935) showed that the anterior-pituitary-like hormone in pregnancy urine would cause enlargement of the prostate in non-castrated males. Geschickter (32) (1937) used the same material in the monkey and produced diffuse enlargement of the prostate. He found that removal of the testes or injury of the testes or prostate by irradiation prevented the prostatic response to this hormone. Focal or suburethral hypertrophy (as seen in human beings) was not seen in the monkey.

Hypertrophy of the prostate occurs in the normal male partner of a parabiotic union with a castrated rat. The stimulation of the testes of the normal partner by the hypertrophied pituitary of the castrated animal is the explanation of this phenomenon (Martins and Rocha (47), 1931, McCullagh and Walsh (52), 1935).

Ferguson (29) in 1933, in a study of 117 cases of teratoma testes, noted diffuse enlargement of the prostate and seminal vesicles, accompanied by hyperplasia of the interstitial cells of the opposite testis varying in degree with the amounts of anterior-pituitary-like substance in the urine.

Powell (68) (1939) noted benign enlargement of the prostate in a seventeen-year-old boy being treated with an anterior-pituitary-like gonadotropic substance. The prostate was enlarged to the point of obstructing the urinary stream and there was a resulting bladder residue of 150 c.cm.

Jones (37) (1939) investigated the possible anatomical relations between the pituitary and the prostate based on the study of specimens from 168 necropsies. In each instance the pituitary showed normal limits of variation as to gross and microscopic structure. In 51 cases of the 168 there was enlargement of the prostate and in 7 atrophy; in the remainder the prostates were normal.

The Results of Hormonal Assay Studies

Owen and Cutler (66) (1936) could find no difference in the amounts of prolan or estrogenic substances contained in the urine of normal men and those with prostatic enlargement. Hamilton, Deming, and Allen (34) (1936) were unable to extract any estrogenic substance from 20 specimens of urine from 7 individuals with prostatic enlargement before and after prostatectomy. This is a surprising finding as the urine of normal men always contains estrogenic substances in appreciable quantities. These workers also failed to extract any estrogenic substance from the 7 enlarged prostates.

McCullagh and Cuyler (54) (1937) observed that the Friedman test was positive in the majority of their cases of benign enlargement of the prostate. A suitable technique for the measurement of gonadotropic substance in the urine of males has been worked out by McCullagh and Bowman (53) of the Cleveland Clinic and is in the process of publication. It is thought that this substance in men originates in the anterior pituitary gland and that the amount found in the urine reflects the activity of that gland. Present results indicate that many patients suffering from benign prostatic enlargement excrete large quantities of the gonad-stimulating hormone.

Champy (15) (1937) found the quantity of male hormone in the prostatic individual to be low or practically absent. Rusch and Kundert (69) (1937) made assays on the urine of 16 such individuals and declared that there was no change in the estrogenic substance but that the androgenic hormone was less than in a normal group.

Inhibin Theory of Prostatic Enlargement

McCullagh (50) in 1932 noted that the lipoid-soluble male hormone maintained the size of the secondary sex glands but failed to correct the hypertrophy of the pituitary gland after castration. From this he postulated the existence of a second male hormone which had as one of its main functions the depression of pituitary-gland activity. Hence he named this hypothetical substance *inhibin*.

From this work and earlier postulates and experiments of his own, McCullagh formulated a hypothetical cause for benign prostatic enlargement. Although existing knowledge necessitates some changes in the original concept there can no longer be doubt concerning the existence of more than one testicular hormone. As early as 1923, Mottram and Cramer (63) had shown that following irradiation of the testes the tubular elements underwent degeneration while the interstitial elements remained normal. Accompanying these changes there was a definite change in the pituitary gland which simulated that which follows castration. No atrophy of the secondary sex glands was noted, so these authors concluded that one testicular mechanism controls the pituitary gland while another is responsible for the maintenance of the accessory sex organs.

It has also been shown that if the testes are placed in the abdomen so that the gametogenic elements are destroyed, the pituitary gland becomes hypertrophied and can be shown to be hyperactive by experiments with transplantation. Here the interstitial cells are still active as shown by maintenance of the secondary sex glands.

Martins and Rocha (47) (1931) reported that if a castrated male rat and a normal one are united in parabiosis (celio-anastomosis), the prostate and seminal vesicles of the normal animal undergo *hypertrophy* while the prostate of the castrated animal *atrophies*. However, if the castrated partner is injected with a testicular mush the hypertrophy of the prostate in the other animal is prevented. They believe that the testicular mush contains a substance which depresses hyperactivity of the castrated animal's pituitary gland. This suppression in turn prevents an overstimulation of the testes of the normal partner and subsequent prostatic enlargement.

McCullagh and Walsh (52) confirmed the results of Martins and Rocha (47) and also demonstrated similar results using the injection of *lipoid-soluble androtin*, with the exception that the accessory sex glands of the castrated animal were maintained. As there had been a marked decrease in the size of the accessories of the castrated animals used in the experiments utilizing a testicular mush it was theorized that some active principle other than the lipoid-soluble one might be present in the testes.

The next step was to inject the expressate of whole beef testes into a number of normal rats with a resulting diminution in the size of the secondary sex organs. This was contrary to the results obtained with injections of androtin. To elicit further proof, a lipoid-free beef testicular expressate was injected into normal rats and prostatic atrophy was produced.

McCullagh's resulting conclusions as to the etiology of benign prostatic enlargement have been termed the inhibin theory. His explanation of the condition was that if this inhibitory substance which is intimately connected with gametogenic elements of the testes tends to disappear in the later years of life, the pituitary gland will hypertrophy. This results in an overproduction of the gonadotropic substance and stimulation of the interstitial cells with an enlargement of the prostate and accessory glands.

The substance inhibin, known to be water-soluble, has never been isolated in its pure form. The cell of its origin has not been definitely established, but the bulk of evidence, as noted above, points toward the gametogenic elements.

Evidence which supports the inhibin theory was brought forth in 1933 by Myers, Vidgoff, and Hunter (64). These workers produced atrophic changes in the prostates of rats fed desiccated beef testes. It is well known that the lipoid-soluble hormone which causes prostatic hypertrophy in experimental animals is inactive when given orally and in any case is present only in minute amounts in beef testes. This is demonstrated by the fact that David and Laqueur used 1 ton of bull testes to produce from 150 to 270 mgm. of testosterone.

Later (1939), one of these investigators (Vidgoff) (84) injected lipin-free desiccated bulls' testes into normal adult male rats. There was a resulting decrease in the weight of the prostate as well as atrophic and degenerative changes simulating the changes seen in castrated rats.

It is interesting here to note the work of Teem (80) in correlating the size of the prostate with the microscopic findings in the testes. He found that the decrease of the average number of interstitial cells is parallel in subjects with benign enlargement of the prostate and in those who have a normal prostate up to the age of sixty-nine. After this age the average number of interstitial cells in those with benign enlargement of the prostate decreases more rapidly than in those with normal glands. He concludes that the secretion elaborated in the interstitial cells is in the nature of an *antihormone*. On the other hand, a good state of preservation of seminiferous tubules and spermatogenesis was frequently seen in men between the ages of forty and eighty-nine.

Bisexual Theory of Prostatic Enlargement

Some workers believe that the prostatic adenoma develops from anatomical formations of female origin in the prostate. This idea has been hypothecated from the effect of the estrogenic substance on the prostate of experimental animals. This view is based also on the supposition that the male elaborates an estrogenic substance and also that the prostatic enlargement occurs only when the male hormone is deficient.

Moszkowicz (62) (1932) was of the belief that the prostate is formed of a bisexual part and a male part and that prostatic enlargement takes place at the expense of the bisexual part.

Zuckerman (96) (1936) put forth the theory that the male produces a male hormone and an estrogenic substance so balanced that the estrogenic powers are inhibited. In the so-called male climacteric this balance becomes altered so that the estrogenic phase becomes dominant. It then exercises its own power to produce changes resulting in the benign enlargement of the prostate.

Cuneo (18) (1936) believed that the appearance of the prostatic enlargement between the ages of fifty and sixty was an indication of impaired secretion of the male genital gland. He found in men past forty, a group of utricular glands under

the mucosa just above the veru, which he believed to be descended from the muellerian duct and which was not found in younger males.

Wugmeister (91) (1937) thought that benign enlargement of the prostate was due to a deficiency of estrogenic substance normally present in males. This resulted in a hypervirilization which he believed should be treated with estrone. He carried out this treatment in 23 cases with marked functional improvement and a decrease in the size of the prostate.

Evidence Against Hormonal Control of the Prostate

Deming, Jenkins, and von Wagenen (25) in 1935 confirmed the ideas of Randall who believed that prostatic hypertrophy arose from the lateral lobes of the prostate, the prespermatic lobe of the prostate, and the submucosal glands of the prostatic urethra and trigone. They demonstrated that castration had no effect on the submucosal glands of the posterior urethra and trigone, the seat of 50 per cent of all prostatic enlargement. In 1935 Deming (26) was of the opinion that the remaining 50 per cent arose in the prostatic tissue and that here the normal tissue was atrophied, probably because of pressure from the adenoma. Hence, he concluded, it was useless to give a hormone to cause the further atrophy of an already atrophied gland. More recently (1939), however, Deming and Wolf (27) have put forth the idea that the components of the prostate gland responsible for benign enlargement of the gland were the muscle fiber, originally part of the lower muellerian tube and the prostatic ducts. The process, according to Deming, begins as a solid fibromuscular mass in the muscular wall of the prostatic urethra. This mass stimulates an epithelial proliferation of the ducts. The primary tumor is then invaded by the duct epithelium, which forms glandular tissue and grows more rapidly than the stroma; hence, the mass may appear wholly glandular. The glands of Albarran and the glands of the posterior and lateral lobes are not involved in the early phases of development. Deming and Wolf also state that benign enlargement of the prostate is composed of *hyperplastic* and *not hypertrophied* tissue. They compare the growth of the uterine myoma and note that hypothetically they have a *common anlage*.

Teem (80) (1936) presented a case of carcinoma of the genitaloid cells of the testis accompanied by practically an absence of interstitial cells in a man sixty-five with benign enlargement of the prostate. He also included 3 cases of interstitial-cell tumors of the testes associated with a normal or subnormal prostate.

Geschickter (32) (1937) stated that pathological hypertrophy of the prostate affects usually a single portion of the gland in the periurethral region. It is focal in character, not a simple diffuse enlargement, and it cannot be assumed that the hormonal control of normal growth and the control of pathological growth are identical.

Champy (15) (1937) is of the opinion that the female part hypertrophies in clinical benign enlargement of the prostate. He believes that the hypertrophy obtained in castrated animals with estrone affects the muscular and not the epithelial elements. Therefore such a hypertrophy does not resemble the lesions found in man.

Clinical Application of the Male Hormones in Benign Prostatic Enlargement

The hormonal treatment of benign enlargement of the prostate, in the main, has been based upon one of the two etiological theories brought forth in our discussion of the experimental work. Those who believe in the bisexual concept have used some form of the male hormone in an endeavor to overbalance the effect of the estrogenic substance. On the other hand, those who favor the inhibin theory have given preparations which they feel contain the water-soluble fraction "inhibin." This substance, they believe, inhibits the action of the pituitary gland upon the testes and thereby prevents an overproduction of the lipoid-soluble male hormone.

Many workers have noted good results from the administration of the lipoid-soluble male hormone. Perhaps one of the earliest substances was *hombreol*, used by von Capellan (12) and Laqueur (41) in 1934. Laqueur reported definite improvement in 66 per cent of the patients treated with this preparation. Some months later von Capellan reported 50 cases which had been under treatment and noted that 50 per cent showed favorable improvement of both objective and subjective symptoms. Although there was a definite reduction in the amount of residual urine, there was some question as to the diminution in the size of the prostate gland. This series of cases included all types of benign prostatic enlargement.

Testosterone propionate has been the most widely used preparation of all the male hormones. Laroche (42) and his coworkers (1937) using testosterone acetate as well as the propionate relate that a diminution in the size of the enlarged prostate was obtained. However, they

pointed out that this was due probably to the alleviation of congestion and inflammation in the prostatic area.

Schmitz (72) (1937) treated 42 patients with testosterone propionate and stated that good results were obtained. Oberholtzer (65) (1938) used testosterone propionate parenterally in the treatment of 34 patients with benign enlargement of the prostate. Five mgm. were administered for an average of ten or twelve days. Favorable results were obtained in 27 cases. The first improvement was noted from three to seven days after the beginning of the treatment. In this series improvement in kidney function was noted and, in some patients, a reduction in blood-nitrogen retention. All showed a decrease in the pathological alteration of the urine with a marked decrease in functional symptoms. The size of the prostate was not altered in any of the patients. The improvement extended over a period of from three to six months following the last injection. An interesting observation made in those patients who also had hypertension was a marked reduction toward the normal blood-pressure level which continued for some time after the treatment was discontinued. Oberholtzer concluded from his findings that the best results were obtained in those having an early benign enlargement of the prostate.

Cary (13) (1938) reported his first observations on 26 cases of prostatitis and benign enlargement of the prostate. Testosterone propionate was administered over a period of two months, twelve doses of 5 mgm. each being given. Favorable results were reported in 20 of these cases. In addition to the improvement of the subjective functional symptoms, there was a reduction in the amount of residual urine and, cystoscopically, the prostate was thought to be smaller.

Further observations were made by Cary in 10 of the same patients. He found that while having received no treatment over a period of six months they remained in excellent condition. An additional 18 cases of benign prostatic enlargement were placed under hormonal treatment. In this series he again found a marked improvement in the subjective symptoms after only 3 injections of 5 mgm. each of testosterone propionate. After 12 injections, there was a considerable reduction in the amount of residual urine.

Hamilton and Gilbert (35) in 1938 observed a group of well controlled patients with benign enlargement of the prostate. Using testosterone propionate they obtained favorable results in 7 of the cases treated. Improvement was noted in the subjective functional symptoms as well as a reduction in the residual urine. These authors are of the opinion that the benefit derived from the treatment was due in a large part to stimulation of the body vigor and muscular tone. It was observed with continued treatment, that even though there was further enlargement of the prostate, the symptoms did not reappear.

Day (22), Belt (1), and Strohm, Edelson, and Merryman (79) (1938) reported favorable results from the use of testosterone propionate. Strohm found the results less favorable in those patients in whom the obstructive symptoms had been of long duration and the gland quite large. He noted a marked decrease in the size of the gland in 2 cases.

Bolend (4) (1939) treated 23 cases: 12 of benign enlargement, 9 of benign enlargement with prostatitis, 1 of carcinoma of the prostate, and 1 of postoperative resection dribbling. Ten milligrams of testosterone propionate were administered three times a week until from 150 to 200 mgm. were given. Forty-three and five-tenths per cent of the patients were rendered clinically well or symptom-free, while 30.5 per cent showed some improvement. Those who failed to show improvement were the patients with benign enlargement accompanied by a chronic infection of the gland. Five of these patients died of other causes.

In a later series of 35 cases Bolend reports a higher percentage of beneficial results. This he attributes to the fact that the preparation was used only in patients with uncomplicated benign enlargement of the prostate.

Biopsy of the prostate was taken in these cases before and after the administration of testosterone propionate. These biopsies were taken with the Stern-McCarthy resectoscope or with the Caulk punch. Microscopic examination revealed that following the administration of testosterone propionate there was (1) an exaggeration of glandular hyperplasia replacing the stroma, (2) a reduction or, at least, no increase in the stroma, and (3) less evidence of chronic infection.

Turner (82) (1939) noted an enlargement of the prostate in individuals with hypogonadism treated with testosterone propionate. This confirmed the findings of Vest and many others. He also reported 1 patient with benign enlargement of the prostate, who after receiving 10 mgm. of testosterone propionate three times a week for five weeks obtained complete symptomatic relief. The prostate seemed less turgescent and reduced in size.

Sharpey-Schafer (73) (1939) reported 1 case treated with massive doses of testosterone pro-

pionate. This patient also had the benefit of suprapubic drainage. It was noted that following treatment the prostate was but one-third of its former size. Microscopic sections taken before and after the hormonal therapy showed no difference in the structure of the tissue. The author was of the opinion that reduction of the prostate may have been the result of the suprapubic drainage.

Stimpfi (78) (1938) treated a series of patients with benign enlargement of the prostate by using testoviron, which is a lipoid-soluble male hormone similar to testosterone. He gave from 220 to 2,020 mgm. over a period of from twelve to fifty-eight days. He also observed the prostate and bladder neck through a suprapubic fistula in each case, and noted that the prostate became larger following the administration of the testoviron. He did state, however, that some patients emptied the bladder with greater ease, but presumed this to be due to the increased tonus of the bladder musculature.

A few clinicians have used androstine, which is a glandular preparation, the "A" portion containing the water-soluble active principles and the "B" portion the lipo-soluble active principles of the male genital glands. The preparation in tablet form combines the two portions.

Androstine "B," the lipo-soluble fraction, has properties similar to testosterone propionate, while the water-soluble portion, Androstine "A," is essentially the same as McCullagh's substance which he terms "inhibin." This preparation has been used by some workers because it was believed that androstine utilizes therapeutically all the active androgenic substances of the testicle.

Erdelyi (28) (1937) observed a number of patients with benign enlargement of the prostate following the parenteral and oral administration of Androstine A and B. One ampoule was given daily for a period of twelve days, alternating the A and B fractions. Twelve more injections were given, one ampoule every other day. The treatment was completed by giving the tablets for a period of eight weeks following the last injection. Erdelyi concluded from this study that there was an improvement in the general condition of the patients, the urine passed more freely, and the nocturia was diminished, but there was no change in the size of the prostate. He made the suggestion that the operable cases be treated with surgery and the inoperable cases be administered androgenic hormones.

Walther and Willoughby (87) (1938) combined the use of androstine and of testosterone propionate in 12 cases and found that all responded most favorably.

Meltzer (56) (1939) also combined the use of androstine and of testosterone propionate in 22 patients with benign prostatic enlargement. He gave 30 injections, each containing 25 mgm. of testosterone, and 1 ampoule of androstine, alternating A and B. Later a maintenance dose of 10 mgm. was given each week. Forty-five per cent of these cases showed marked improvement of all subjective symptoms. There was no change in the size of the prostate nor any decrease in the amount of residual urine.

The use of the water-soluble fraction termed inhibin was favored by those who were advocates of the theory that this androgen exerted an inhibitory action on the anterior pituitary lobe. This organ in turn prevented an overproduction of the lipo-soluble male hormone, which, to these workers, was the causative factor in the production of benign enlargement of the prostate.

Lower, Engel, and McCullagh (45) (1935) administered desiccated beef testes orally to 76 patients suffering with benign enlargement of the prostate. Each patient received the equivalent of 60 gm. of fresh beef testicular tissue daily. Forty-eight cases or 63 per cent were believed to show improvement. It was believed the treatment was most suitable in that type of case in which there was present an enlarged, rather succulent soft gland. The type of gland present and results obtained are shown in Table 1.

TABLE I.

Type	Improved and symptom-free	Unimproved	Total
Simple bilateral enlargement	14	10	24
Trilobar enlargement	17	9	26
Middle lobe enlargement	4	4	8
Not specified	13	5	18

The first signs of improvement after treatment with inhibin was instituted were decreased nocturia, greater ease in voiding, increase in the caliber of the stream, and reduction in frequency of urination. All patients reported a feeling of general well-being. No definite reduction in the size of the prostate gland could be established in any of the cases treated. No discernible difference in the histological appearance of the prostate tissue was noted following treatment. Experimentally in animals, however, there was a marked change in tissue structure both grossly and microscopically.

Further observations were reported in 1937 by Lower (44) on the cases mentioned previously and an additional 75 patients were placed under

treatment. At this time a total of 57 per cent of the patients had experienced or continued to experience relief from their functional symptoms. Those placed under inhibin therapy in 1935 continued to respond favorably only if a maintenance dose of 20 gm., or one-third of the original dose, was administered daily. It was found that if the preparation was discontinued completely the patient's bladder-neck obstructive symptoms soon returned.

McComb and Pearse (49) (1937) working in close collaboration with Lower's group treated 17 patients with this same preparation. They obtained improvement in 46.6 per cent of their cases, but 53.3 per cent did not respond. Concurrent urethral catheter drainage was used. The average time on inhibin before the catheter was removed permanently was thirty-one days. There was no reduction in the size of the gland either by rectodigital examination or cystoscopically. These authors stated that those patients showing improvement emptied their bladders, and did so easily following this therapy.

Cuneo (19) (1936) administered a total hydroglycerine extract of bulls' testes to 18 patients and obtained a decrease in the size of the prostate and alteration of the symptoms in 60 per cent of his cases.

Bergmann (2) (1937) gave a water-soluble preparation and claimed good results. However, no details were included as to the type of case, dosage of the drug, or length of administration of the drug.

Champy (16) (1939) reported favorable results with a testosterone-free testicular hormone given parenterally.

Approximately from 40 to 60 per cent of the patients treated with either or both the liposoluble or water-soluble preparations have obtained relief of their functional symptoms. In only an occasional case was any change noted in the size of the prostate. However, numerous cases were reported in which the bladder residuum was definitely diminished following the onset of hormonal therapy. All patients claimed a feeling of general well-being.

Testosterone propionate was the preparation most widely used. The usual dosage has been from 10 mgm. to 25 mgm. two or three times weekly for a period of from ten days to two months. A maintenance dose of 10 mgm. weekly was advised following the initial course of treatment.

In this review of the literature on the clinical application of the hormonal preparations one is quite obviously impressed with the fact that the results in many of these cases have been rather hastily evaluated. Certain features of the clinical investigation have been omitted while the duration of treatment and period of follow-up have been entirely too short.

After carrying on, at the Cleveland Clinic, considerable animal experimentation and clinical experimental work on the hormonal etiology and therapy of benign enlargement of the prostate, we believe that the following plan of investigation will afford the maximum amount of information.

The presenting patient should have:

I. History and physical examination—to include endocrinological observations
II. Cystoscopic examination with calculation of the residual urine, cystography, and cystometric studies
III. Laboratory work
  A. Routine
    1. Blood counts
    2. Complement fixation
    3. Blood sugar
    4. Blood urea
    5. Blood non-protein nitrogen
    6. Urinalysis and culture of bladder urine.
  B. Kidney function
    1. Intravenous phenolsulfonphthalein
    2. Urea clearance
    3. Intravenous excretory urogram
  C. Hormone assays, forty-eight-hour urine specimen
    1. Gonadotropic substances
    2. Estrogens
    3. Androgens
  D. Semen examination

If one intends to start hormonal therapy after a thorough evaluation of the facts obtained from the afore-mentioned procedures, a biopsy of the prostate gland should be done.

During the course of the treatment the patient should be kept under careful observation. Every effort must be made to elicit any change in the size of the prostate. This should be done by cystoscopic examination or with cystography. The patient's ability to empty his bladder can be determined by frequent cystometric studies and measurement of the bladder residuum. The third important observation is to note any change in the tissue structure of the prostate. Biopsy of the gland after a known period of treatment is, of course, the manner in which to check this condition. Forty-eight-hour specimens of urine should be collected at intervals during the course of treatment and the hormone content again determined. The effects of the hormone on spermatogenesis should also be followed.

The question arises as to the dosage, the advisability of a maintenance dose, and the length of a period of observation following treatment. These points have not been satisfactorily established and only by exact scientific investigation will they be determined.

The clinician should maintain a group of similar cases without treatment to be used as controls. It has been shown by Clarke (17) and others that benign enlargement of the prostate in the human being may undergo spontaneous amelioration. Hinman (36) states that 50 per cent of the men who develop prostatic enlargement never have obstructive symptoms and, in a number who do, the trouble is only temporary. As most of the patients under hormonal treatment obtain a feeling of well-being the psychic effects of the therapy must be evaluated.

CONCLUSIONS

1. A definite relationship between the testes, prostate, and pituitary gland in animals has been established. However, there is no conclusive evidence to prove that such an association is present in man.

2. The theories of etiology of benign enlargement of the prostate gland are conflicting and confusing. Since the type of enlargement of the prostate produced in animals does not coincide exactly with that seen in human beings, one cannot assume that the hormonal control of normal and pathological growth is identical. It may be possible that there is more than one cause of benign prostatic enlargement.

3. A lipoid-soluble substance from the testis, isolated in pure form, has been shown to prevent atrophy of the secondary sex glands if administered parenterally to castrated animals. This same substance causes enlargement of the prostate in normal animals. There is also evidence to show that the testes elaborate a second male hormone, water-soluble in nature, which has an inhibitory effect on the prostate of animals. The application of these findings to the clinical care of prostatic enlargement awaits further investigation.

4. The results of the clinical use of hormones in benign enlargement of the prostate, which on the surface appear remarkable, are unconvincing if the work is thoroughly investigated. There has been no definite evidence that any of the so-called male hormones have an effect on the size of the prostate gland. The relief of functional symptoms reported by many with the use of hormones may then be assumed to be due to some mechanism other than the expected effect on the prostate gland.

5. From the present evidence we feel that further clinical application of the use of male sex hormones in the treatment of benign enlargement of the prostate should be purely from an investigative standpoint.

6. A method for the thorough study of this problem has been outlined.

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GENITO-URINARY SURGERY

ADRENAL, KIDNEY, AND URETER

Shiflett, E. L., and Keith, D. Y.: Lateral Pyelography. *Am. J. Roentgenol.*, 1940, 43: 664.

Lateral pyelography is not recommended for a routine examination but it is frequently indicated and sometimes necessary. The technique requires that the patient be in an exact lateral position, with the questionable side next to the film. The side uppermost is subject to considerable distortion. The exposure should be the shortest possible. The roentgenogram should visualize the usual quantity of pyelographic medium or opaque catheter in the ureter and kidney. Occasionally, in large individuals an increase in concentration of the pyelographic medium permits a better visualization. The best results are obtained by the retrograde technique, but in pathological processes accompanied by stasis, lateral intravenous urography can be done quite satisfactorily.

The normal lateral pyelogram shows the shadow of the pelvis usually superimposed on that of the second lumbar vertebra, but sometimes on part of the first and second, or second and third lumbar vertebræ. The long axis of the renal pelvis and the spine correspond. The superior and inferior calyces extend up and down, respectively, but if there is some rotation of the kidney on its long axis, the calyces may point backward toward the spinous processes, or be visualized through the pelvis. The ureter descends in a smooth convex curve anteriorly behind the shadow of the vertebral bodies until it reaches the inferior margin of the fourth lumbar vertebra where it becomes anterior and passes downward just anterior to the fifth lumbar vertebra and the lumbosacral joint; then it becomes slightly convex posteriorly to deep in the pelvis, where it again comes forward to enter the bladder. The anterior surface of the ureter in relation to the peritoneum is fairly constant. Normal variations must be learned by experience. The lateral pyelogram should establish the type and the degree of rotation of the kidney and the anteroposterior position of the kidney and the ureter. The combination of types and degrees of rotation and displacement varies with different lesions and constitutes the essential basis of diagnosis from lateral pyelography, but this information must be correlated with that obtained from the routine pyelogram and the pathological behavior. The most significant combination is that of vertical rotation and displacement.

The authors have found the information obtained helpful and at times conclusive in the diagnosis of the following lesions: renal neoplasms and cysts, perinephric abscess, primary retroperitoneal tumors and infections, tumors arising from organs adjacent to the kidney, retroperitoneal metastatic growths, congenital and acquired abnormalities of the kidney and ureter, and many miscellaneous conditions encountered in the investigation of the urinary tract.

Perinephric abscess causes predominantly anterior displacement of the kidney and the ureter associated with variable degrees of vertical and horizontal rotation. The amount of displacement depends upon the extent of the infiltration, the degree of suppuration, and the location of the suppuration. When these dynamic signs are correlated with acute pathological behavior, the diagnosis becomes relatively simple. It may be quite difficult, if not impossible, to differentiate a chronic indurated perinephric abscess from a retroperitoneal sarcoma without the evidence of acute pathological behavior.

Most cortical neoplasms can be detected from the routine pyelogram. Occasionally, the lateral pyelogram will give the only conclusive evidence of a renal neoplasm, permit the differentiation of retroperitoneal tumors displacing the kidney, or prevent the diagnosis of tumor because of a vertically rotated kidney. Cortical neoplasms cause predominantly vertical rotation, variable degrees of horizontal rotation, and little, if any, anterior displacement of the kidney or the ureter. If there is appreciable anterior displacement of the kidney and a localized segment of the ureter with evidence of an intrarenal malignant growth, the tumor has probably invaded perinephric structures and is probably inoperable. The authors suggest that the lateral pyelogram be employed in all cases suspected of malignant growth clinically or roentgenologically.

Large solitary cysts of the kidney cause considerable vertical and horizontal rotation without a comparable degree of anterior displacement, even when the cyst is huge, and most often there is no appreciable displacement. Cysts cause less compression deformity than a malignant tumor of like size, rarely distort the pelvis unless there is an associated infection, and often appear as an accessory rather than an incorporated mass because of the difference in the genesis of the lesion. There is practically always a mechanical hydronephrosis (general or partial), because of chronic compensation which is more often not present in malignant neoplasms on account of the more rapid growth of the latter. A great effort should be made to differentiate between small serous cysts and small neoplasms because the solitary cyst often causes no symptoms and a useless operation may be avoided. The differential diagnosis is particularly difficult when the small cyst involves the upper pole, because the law of probability favors a malignant neoplasm.

Retroperitoneal tumors include both the true retroperitoneal sarcoma and tumors originating from adjacent retroperitoneal organs, particularly the tail of the pancreas. Primary retroperitoneal tumors cause considerable anterior displacement which is always associated with a considerable degree

of horizontal and vertical rotation. This tends to differentiate them from perinephric abscess, which causes predominantly anterior displacement of the kidney and ureter, and from primary renal tumors which cause predominantly vertical and horizontal rotation of the kidney without displacement or without appreciable displacement of the kidney and ureter. If a retroperitoneal lesion is demonstrated and does not conform to these criteria, another possible origin and the probable result of the physical force of the lesion must be considered. Its origin, if not its actual nature, may be determined.

A good rule to follow is to make a lateral pyelogram when the routine pyelogram leaves one in doubt as to the probable significance of some aberration from the average normal. Congenital and acquired lesions at the ureteropelvic junction, vague causes of partial and complete hydronephrosis, unusual appearing pelves, anomalies of development which might lead to clinical confusion, calcifications anterior or posterior to the kidney which may appear to be in the kidney pelvis because of superimposition, and differentiation between intra-abdominal and retroperitoneal masses, all lend themselves well to study by lateral pyelography.

LOUIS NEUWELT, M.D.

Nesbit, R. N., and Dick, V. S.: Acute Staphylococcal Infections of the Kidney. *J. Urol.*, 1940, 43: 623.

Certain facts concerning the pathology, diagnosis, relationship to secondary organisms, complications, and treatment of 80 cases of acute staphylococcal renal infections are presented by the authors.

It is concluded that acute staphylococcal infections of the kidney are relatively common and are hematogenous in origin, the lesion being cortical and showing a marked tendency to heal promptly and completely. The urine rarely contains pus, but the stained sediment reveals the presence of cocci. Secondary bacillary infection of the urine frequently occurs. Costovertebral pain, tenderness, and fever are constant, and the disease runs a stormy but self-limiting course and ends in complete recovery.

Surgical complications occur in approximately 10 per cent of the cases and their appearance is heralded by an increase in the patients' symptoms and signs. These complications (perinephric abscess and carbuncle of the kidney) are readily diagnosed at their onset and should be treated by immediate drainage. Pulmonary complications of perinephric suppuration occur in 16.5 per cent of the cases and often cause a delay in diagnosis and treatment of the underlying pathological lesion. They clear up on adequate treatment of the underlying subdiaphragmatic disease.

D. E. MURRAY, M.D.

Capacci, P.: The Early Diagnosis of Renal Tumors (La diagnosi precoce dei tumori renali). *Arch. ital. di urol.*, 1940, 17: 3.

Capacci finds that the number of cases of renal tumor which reach the operating table has not increased lately, which is contrary to what has been noted regarding tumors of the other organs; in fact, various statistics show that about 32 per cent of the patients who are sent to the surgeon are inoperable: early diagnosis seems to be the exception rather than the rule.

In order to discover what prevents the early recognition of renal tumor, Capacci has selected for discussion 34 cases of malignant tumor in adults, which have been demonstrated at operation. He presents the data concerning the time of appearance of the first clinical manifestations of the disease, the results of the laboratory, endoscopic, functional, and roentgen examinations, and the operative findings. He points out that hematuria was the first symptom in 76 per cent of the cases and that pain (most often associated with hematuria) was the first symptom in 53 per cent. These percentages are remarkably higher than those given by the majority of the authors, i.e., 50 and from 20 to 25 per cent, respectively. On the other hand, he states that palpable tumefaction has no practical value as an initial symptom and that laboratory examination of the urine can be corroborative only in certain cases. Endoscopic examination during the period of hematuria is of great significance, while functional tests are not. Roentgen investigation and especially retrograde pyelography are very valuable for the early diagnosis of the tumor. The biological tests have not fulfilled expectations up to the present time.

The early diagnosis of renal tumor is a rather difficult problem which has not yet been solved in some of its aspects, but which can be solved in most cases; retrograde pyelography is the most appropriate means for the purpose and is capable of revealing the presence of beginning and only slightly developed tumors. However, the usefulness of the procedure depends on its early application as soon as the tumor has given any sign of its presence. The first sign is nearly always hematuria and therefore deserves the greatest attention. The reported cases show that in most of them too much time has been allowed to elapse between the appearance of this first symptom and the intervention; on the other hand, in a few of the cases in which the diagnosis was made soon after the observation of the first symptom, the tumor was found to be already markedly developed and advanced at the time of operation.

Consequently, there are two reasons for the usual lateness of the diagnosis of these neoplasms:

1. The tumor presents a particularly silent or nearly silent course (the so-called latent form) and causes revealing symptoms only when it has already reached considerable proportions, fatal for the patient. Surgery is useless in these cases.

2. In most cases, too much time is allowed to pass after the appearance of the first suspicious symptom, which is usually hematuria. Yet these are the cases in which early diagnosis is possible and which deserve all the attention of the physician who

is the first to visit the hematuric patient. It happens all too often that this symptom is underestimated and even ignored by general practitioners whose most important duty consists in catching the first signs of the disease, evaluating them properly, and sending the patient to somebody who is capable of verifying the suspected diagnosis with all the available technical means.

Early diagnosis of renal tumor depends on the intimate collaboration between the general practitioner and the urologist. RICHARD KEMEL, M.D.

Everidge, J.: Nephro-Ureterectomy. *Proc. Roy. Soc. Med., Lond.*, 1940, 33: 295.

A review of the literature upon the subject of ureterectomy shows the fact that practically every article seeks either to advocate the wider adoption of the operation or to prove it is unnecessary. The greatest divergence of opinion is found with regard to tuberculosis, the least with regard to tumors. In a series of 30 operations, 24 of which were performed for tuberculosis, the author explains the pre-operative investigations, the technique of extraperitoneal nephro-ureterectomy, and the postoperative complications and results.

It is concluded that in cases of tuberculosis which require nephrectomy the danger of extending the operation to include a ureterectomy should not prevent the surgeon from removing a potent source of infection. D. E. MURRAY, M.D.

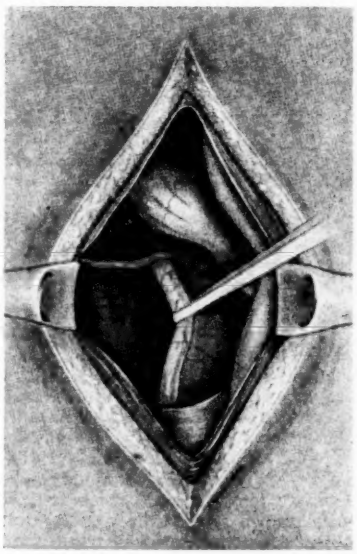

Fig. 1. Separation of the lower third of the ureter. The superior vesical artery has been divided and ligated to allow displacement and elevation of the bladder. The relation to the vas and great vessels is seen. The vertical Joly incision is used and the ureter is supported on a gauze sling.

Nichols, B. H.: Ureteral Obstruction. *Am. J. Roentgenol.*, 1940, 43: 649.

The author's contribution on ureteral obstruction is intended, so he states, to make medical men "kidney conscious." Frequently, ureteral obstructions which may be the cause of the presenting symptoms are overlooked. He presents the anatomy and vascular supply of the kidney, and emphasizes the importance of the nerve supply. He states further that portions of the ureter seem to retain their peristaltic action even though all of the nerves which supply the ureter may be cut. Intermittent or partial obstruction of the ureter produces marked dilatation of the kidney, hydronephrosis and accompanying pain, urinary stasis with resultant infection, and often renal calculus formation. There may also be destruction of the kidney without accompanying pain.

The causes of ureteral obstruction are listed as follows:

A. Lesions of the kidney
   1. Renal calculi
   2. Tumor
   3. Infections
   4. Blood clots
   5. Anomalous renal vessels
   6. Anomaly of position
   7. Duplex kidney
   8. Fused kidney

B. Lesions of the ureter
   1. Ureteral calculi: opaque and non-opaque.
   2. Stricture
   3. Tumors: primary and secondary.
   4. Trauma: ligation; cutting.
   5. Infection
   6. Adhesions: congenital and acquired.
   7. Kinks
   8. Congenital valves
   9. Diverticulum
   10. Duplication
   11. Transplanted ureters
   12. Ureterocele
   13. Atrophic ureter
   14. Megalo-ureter
   15. Ectopic ureter
   16. Extrinsic pressure
   17. Pregnancy

C. Lesions of the bladder
   1. Tumors
   2. Diverticulum
   3. Infarction
   4. Trauma

The author presents roentgenological studies with intravenous urography and retrograde pyelograms, which illustrate the various types of cases that are frequently encountered. He emphasizes the use of excretory urography as an aid in diagnosis.

He concludes that the urologist should be the judge as to diagnosis and management, and that the clinical history and the urological findings combined with roentgenological findings are all necessary in the final diagnosis. J. SYDNEY RITTER, M.D.

BLADDER, URETHRA, AND PENIS

Marini, A.: Direct Transurethral Treatment of Rebellious Chronic Vesiculitis; A Clinical Contribution (La terapia diretta transuretrale delle vescicoliti croniche ribelli; contributo clinico). *Arch. ital. di chir.*, 1940, 17: 54.

Marini recommends direct transurethral lavage of the seminal vesicles in cases of refractory chronic inflammation and describes McCarthy's urethroscope and technique for the catheterization of the ejaculatory ducts. One of the advantages offered by the method is that it allows separate collection of the seminal fluid from each vesicle without the admixture of prostatic or urethral secretion.

Among 156 cases of vesiculitis which came under his observation, he treated 43 with transurethral lavage. All of these patients had been treated previously by various methods without showing any improvement, and they presented the usual subjective symptoms and objective signs. Urethroscopy revealed changes in the verumontanum in most cases, such as hyperemia, edema, pallor, and sclerosis; in 5 cases, there was a small true papilloma close to the orifices of the ejaculatory ducts. Smears and cultures of the seminal fluid showed most frequently the presence of the gonococcus, and much more rarely the staphylococcus, streptococcus, and the bacillus coli.

A preliminary epidural injection of 30 c.cm. of a 1 per cent solution of novocaine with 20 drops of adrenaline was given thirty minutes before the introduction of the urethroscope; when epidural anesthesia was impossible, the patient received an enema with from 20 to 30 drops of laudanum and 1 gm. of antipyrine, and urethral contact anesthesia by means of 10 c.cm. of a percaine or pressocaine solution. Lavage of the seminal vesicles, usually with a 1 per cent solution of electrargol, was repeated from 3 to 8 times at intervals of from five to ten days, and progress was observed by bacteriological examination. One or two lavages were given after disappearance of the bacteria in order to consolidate the result. Bacterial autofiltrates were used in some cases. During the intervals between lavages, the usual therapeutic means, which by themselves had remained without effect on these patients, were employed: massage, diathermic applications with the rectal electrode, urethral irrigation, vaccines, and urinary disinfectants administered intravenously (gonacrine, urotropine, streptosil). The only complication which occurred during the treatment was epididymitis on the day following the first lavage (2 cases). In some of the first patients treated, the temperature rose to from 39 to 40° C. a few hours after the lavage, but never for long and always sank to normal with the intravenous administration of a urinary antiseptic. At present, a urinary antiseptic is always injected after the lavage in order to prevent this possible rise of temperature. After completion of the treatment, 2 patients experienced piercing pains during their first sexual intercourse and painful ejaculations which, however, disappeared spontaneously later. Of the 43 patients treated, 20 were cured, 12 were benefited, and 11 had no benefit. RICHARD KEMEL, M.D.

Thompson, A. R.: Injuries of the Urethra. *Brit. J. Urol.*, 1940, 12: 29.

The author cites a case of rupture of the prostatic urethra, associated with fracture of the pelvis, in the region of the sacro-iliac joint and the body of the pubis. Immediate suprapubic cystotomy with drainage was performed. The resultant stricture was subsequently repaired by perineal operation, and kept open by the passage of sounds. Three months later the patient was found to have a mild pyrexia, with pain in the right side. X-ray examination revealed stones in the right kidney. At operation a perinephritic abscess was found and drained, and the stones were removed by pyelotomy. After a period of six months, a right nephrectomy was done, and later a right ureterectomy.

The author uses this case to substantiate his idea that the kidney lies in what he calls "the renal process of the urogenital fascia." In this instance, he believes that the infection extended up into the periureteric and perirenal tissues and entered the kidney via the capsule.

In the case of gunshot wounds and other mutilating traumas, Thompson advises saving as much as possible of the urethral mucosa.

Referring to traumatic stricture of the urethra, he states that frequent observation is necessary; the stricture should be kept moderately dilated without further trauma or the production of pain. Internal urethrotomy is resorted to when necessary.

THEOPHIL P. GRAUER, M.D.

GENITAL ORGANS

Huggins, C., and Stevens, R. A.: The Effect of Castration on Benign Hypertrophy of the Prostate in Man. *J. Urol.*, 1940, 43: 705.

The effect of castration on benign prostatic hypertrophy is a debated question, and a contradiction of opinion exists at the present time as to the effect of removal of the gonads on enlargement of the prostate gland.

In order to evaluate the conflicting evidence, castration of 3 patients with prostatic hypertrophy was carried out by the authors. Biopsy specimens of the prostate were secured at the time of castration, and also twenty-nine, eighty-six, and ninety-one days later. Epithelial atrophy was not present twenty-nine days after castration, but appeared plainly eighty-six and ninety-one days after the operation. In 1 case there was a marked reduction in prostatic size on rectal examination, and an increase in the size of the urinary stream within one month after castration.

The evidence derived from castration for benign prostatic hypertrophy in man supports the view that the prostatic epithelium, at least, is under the control of the testes. D. E. MURRAY, M.D.

Gayet, R. Therapeutic Considerations and Operative Results in Diffuse Gangrenous Phlegmon of the Perineum (Considérations sur la thérapeutique et les résultats opératoires des phlegmons diffus gangréneux du périnée). *Lyon chir.*, 1939-1940, 36: 661.

Diffuse gangrenous phlegmon of the perineum or "extravasation of urine" has not disappeared even with the modern improved treatment of urethral strictures. In large medical centers 1 or 2 cases a month are seen.

From observation of approximately 20 cases the author states that, although the diagnosis is easy, the general medical man has no idea of the gravity of the condition; that in whatever part of the perineum the reaction first is noticed the origin is always the urethra; and that wide surgical drainage as early as possible is always indicated. If drainage is done within the first twelve or twenty-four hours the prognosis is favorable.

The surgical treatment is described in detail. The author advocates a median incision along the raphe and splitting of the scrotum and its contents into two equal parts without an entrance being made into the tunica vaginalis. From this basic incision other incisions are made wherever there is infection. Most operators are too timid and do not go deeply enough, being afraid of injuring the urethra, which, the author states, does no great harm. Transverse incisions give poor drainage and poor healing. Removal of the infected lardaceous fat should be done with scissors. Drainage occurs through the scrotal cleft along both sides of the penis.

The non-surgical aspects of the treatment consist of the use of cardiac stimulants, urotropin, derivatives of sulfanilamide, and diuretics. The author has used anti-gangrene serum in 3 large doses of from 20 to 40 c.cm. on the first day and of 20 c.cm. each on the following two days.

The results of treatment were 7 deaths and 13 survivals. Two patients died of extension of the phlegmon, 2 of repeated hemorrhages, 2 of septicemia, and 1 of uremia. Later treatment of the urethral stricture must be carried out indefinitely.

RICHARD WARREN, M.D.

MISCELLANEOUS

Gordon-Taylor, G.: Complicated Injuries of the Urinary Tract. *Brit. J. Urol.*, 1940, 12: 75.

Many unusual cases of injury to the urinary tract are presented with their treatment and sequelæ. These cases were traumatic injuries from gunshot and shrapnel, injuries occurring during obstetrical and gynecological surgery, and injuries in cancer of the urinary tract.

The author comes to the following conclusions:

The enterprising surgeon is well repaid in the treatment of gunshot wounds of the urinary tract by the lives he saves. The prognosis in plurivisceral wounds is invariably determined by the associated damage to the gastro-intestinal tract or to anatomical areas outside of the urinary system. Concomitant injury to neighboring bone augments the gravity of the immediate prognosis, and in cases produced by the missile of an adversary, consequent sepsis retards convalescence and renders final cure less certain.

The involvement of the thorax and abdomen in gunshot wounds became less and less feared in the War of 1914 to 1918 and the prognosis was good on the whole when solid abdominal organs such as the kidney were implicated.

The removal of portions of the urinary tract in the extirpation of cancer has been found to be associated with no forbidding mortality, and the end-results often justify this extension of the operation.

JOHN A. LOEF, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Paltrinieri, M.: Circumscribed Cortical Osteitis (Osteiti corticali circoscritte). *Chir. d. organi di movimento*, 1940, 25: 407.

In 1834 Brodie described a type of chronic bone abscess which is characteristically located in the spongy bone of the metaphysis. Since then many authors have described series of such cases, including with them cortical abscesses occurring in the diaphysis. Bernadini in 1934 pointed out some of the differences between the two types and suggested that they be classified separately. In the last few years, several Italian and French authors have described cases of this circumscribed cortical osteitis. Leriche has remarked on its possible confusion with Ewing's tumor. The author believes that this cortical lesion is as common as Brodie's abscess and lists its principal characteristics as follows:

1. It is observed chiefly during childhood and adolescence.
2. The chief symptom is pain, which appears early, prevails at night, and does not always stop with immobilization.
3. The lesion has been located in the cortex in the diaphysis of long bones.
4. Radiologically it consists of a rounded focus of rarefaction with a zone of circumscription and of cortical condensation; the medullary canal is not usually altered.
5. The lesion is small, often about ½ cm. in diameter.
6. The course is chronic.
7. Upon intervention one finds pus, some small sequestra, or granulation tissue, according to the phase of the disease.
8. The responsible organism in this series was always the staphylococcus.
9. Surgical exploration of the diseased segment or the opening of the focus quickly results in complete disappearance of the pain and a rapid cure.

FRANK MCDOWELL, M.D.

Gherlinzoni, G.: The Frequency and Course of Abscesses of Bony Origin (Frequenza ed evoluzione degli ascessi ossifluenti). *Chir. d. organi di movimento*, 1940, 25: 391.

The present article is a statistical analysis of 1,054 patients, representing the total number with bone and joint tuberculosis observed in the Codivilla Heliotherapy Institute between 1923 and 1938.

Of the 1,054 patients, 40 per cent had neither abscesses nor fistulas, 36 per cent had abscesses, and 21 per cent had one or more fistulas without any palpable mass. About 1 per cent of those with dorsal spondylitis had radiographic evidence of mediastinal abscesses.

The patients in the third and fourth decades of life had complicating abscesses most frequently. In the chronological appearance of abscesses with relation to the onset of the disease, it was noted that they appeared very early and frequently with sacro-iliac or spinal involvement, and were often the initial symptom. In the knee and upper extremity they tended to appear later.

With spondylitis, the abscesses that appeared early had a greater tendency toward resorption, while those appearing late were more prone to form fistulas. This observation is of prognostic value.

The fistulas originating from tuberculosis of the knee, foot, and sacro-iliac regions were cured more often than those in other locations.

About 25 per cent of the abscesses regressed following puncture evacuation and a similar number regressed without this procedure. Some 15 per cent formed fistulas following this form of treatment. The lesions associated with spondylitis had a lesser tendency to be reabsorbed spontaneously, while those about the knee most often responded favorably to evacuation without the formation of fistulas.

Approximately 27 per cent of the abscesses had draining fistulas when the patients entered the institute, which persisted indefinitely. Lesions of the feet were preponderant in this respect.

FRANK MCDOWELL, M.D.

Policard, A.: Certain Elementary Histological Mechanisms that Take Part in the Repair of Bone (Sur quelques mécanismes histologiques élémentaires intervenant dans la reparation osseuse). *Presse méd.*, Par., 1940, 48: 409.

Policard notes that more attention has been paid to the process of bone formation than to the process of construction by which the bone tissue is built into a coördinated structure. Bone is made up of a fibrillar stroma and calcareous-protein substance laid down in this stroma. From the point of view of mechanics the latter substance resists pressure, and the fibrillar stroma resists tension. The fibrillar stroma, however, plays the leading rôle in modifying the extension of bone in the process of formation and the direction in which this extension takes place.

In fractures that are well immobilized without displacement of the fragments, there is at first a fibrinous deposit between the ends of the fragments formed by blood and exudate from the fractured bone. By the third or the fourth day filaments of fibrin extend from one fragment to the other like a bridge; these filaments become connective-tissue fibers which unite the two fragments (the connective-tissue callus). On this framework the bone substance is laid down, which ultimately forms the true callus and repairs the fracture. The formation of the true callus depends upon the anatomical formation of good connective-tissue callus. In fractures that are

poorly reduced with displacement of the fragments, or in which there is considerable loss of substance, the connective-tissue fibers cannot easily form a bridge between the two fragments. Under the influence of many local factors, these fibers extend in many different directions. The effect of tension is of the greatest importance in determining the direction of these fibers. If the mass of the fibers is parallel to the axis of the fractured bone, conditions are favorable for the formation of satisfactory bony callus. If the fibers are perpendicular to the axis of the bone, new bone tissue may be formed, but it does not satisfactorily unite the two fragments, and pseudarthrosis results.

Clinical experience has demonstrated the advantage of traction in bringing about satisfactory callus formation and repair of fractures. However, this cannot be explained by any simple mechanical theory. In the biological process of bone formation and construction, many factors are involved: the conditions existing at the time the formation of fibers began; the effect of tension on the extending blood vessels; the effect of tension due to functional activity (action of muscles); and the condition of the surrounding tissues. It is these factors that demand further investigation before the process of bone repair can be thoroughly understood. ALICE M. MEYERS.

Larghero-Ybarz, P.: The Pathogenesis of Bi-Epiphyseal Hydatid Disease of the Joints (Patogenia de la hidatidosis bi-epifisaria de las articulaciones). *Bol. Soc. de cirug. de Montevideo*, 1939, 10: 323.

The invasion of both epiphyses of a joint by the echinococcus has been noted in several instances. Ivanissevich recently summarized the literature and his own investigations of this condition. He stated that it is certain that the echinococcus can spread from one epiphysis to the other of an articulation. The di-arthric cartilage constitutes, by its structure and absence of vessels, a barrier which is not penetrable unless it has been damaged. It can be atrophied and destroyed, in which case the synovial cavity may be occupied by hydatid elements. Therefore, in cases of bi-epiphyseal disease the opposite cartilage should also be damaged or destroyed, but such a process has never been observed. Conversely, it is not rare to observe cases in which the synovial cavity and cartilages are intact and the articular serosa is clean, but both epiphyses present massive infiltration. The periarticular ligaments could be the route of propagation of the infection, but their hydatid lesions are usually of the macrovesicular type and are separated from the microvesicular lesions of the epiphysis by intact cortical bone. The connecting pathway is therefore unknown.

The author studied 2 cases of bi-epiphyseal hydatid disease of the knee with the aid of frontal and sagittal sections, and concluded that the crucial ligaments furnished the route of propagation in each instance. FRANK MCDOWELL, M.D.

Santanelli, L., and Poggi, A.: Polycystic Meniscus of the Patella (Menisco poliqu'stico de la rodilla). *Bol. Soc. de cirug. de Rosario*, 1940, 7: 41.

Bibliographic references to polycystic menisci of the patella are very scanty. Trauma is recorded in approximately 45 per cent of the cases. Being more exposed, the external meniscus is more frequently injured than the internal meniscus. The differential diagnosis should consider a hernia of the articular synovia, expansion of the serous bursa of the biceps muscle, fibroma, chondroma, capsular lipoma, and articular tumors with various characteristics. The treatment method of choice is extirpation of the injured meniscus.

The author describes in detail an injury of the external meniscus in a twenty-five-year-old man. Repeated traumas were given by the patient as the cause of the condition. He consulted the author on account of an impaired gait and pain in the involved extremity. Roentgenograms revealed an absence of osseous lesions. The injured meniscus was removed under spinal anesthesia through a transverse incision. A functional recovery promptly followed the operation. The histopathological examination revealed polycystic cartilage.

JOSEPH K. NARAT, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Froehlich, M. F., and Vassilaros, M.: Follow-Ups on Cases of Late Intervention in Acute Osteomyelitis of the Radius in the Growth Period (Résultats éloignés d'interventions retardées pour ostéomyélite aigue du radius en période de croissance). *Lyon chir.*, 1939–1940, 36: 675.

The authors report 2 cases of osteomyelitis of the radius in youth, which were accompanied by loss of substance of the bone and radial deviation of the hand. One was observed forty-four years after its onset at the age of sixty, and the other, found in a patient aged eleven, was treated by the authors from the beginning over a total recorded observation

Fig. 1. Deficient regeneration of the radius.

period of nine months. In the latter case the deformity was corrected by traction for three months, and recurrence is being prevented by a brace to be worn throughout the growth period.

RICHARD WARREN, M.D.

Benedetti-Valentini, F.: The Treatment of Suppurative Lesions of the Joints, with Particular Reference to the Initial Form (Il trattamento delle suppurazioni articolari con particolare riguardo alle forme iniziali). *Policlin.*, Rome, 1940, 47: sez. chir. 41, 81.

In the treatment of articular infections, certain anatomical considerations require emphasis. The capsule is a closed space like the peritoneal cavity, lined by synovial and cartilaginous tissue. The cartilaginous fractions are *tardily* affected by the presence of an infectious process and serve to cushion the underlying bony structures. The synovial membrane, on the other hand, responds readily to the presence of bacterial toxins by the production of a serous exudate rich in antibodies, and in the first phases of the inflammatory process acts as a barrier, impermeable alike to the organisms passing outward and to the leucocytes traveling inward to the site of invasion. Later, the endothelial permeability undergoes alterations, and the synovial fluid becomes rich in protein material and leucocytes. In this manner, the situation known as articular empyema or acute purulent synovitis develops.

Basing his therapy upon these considerations, the author treated 5 cases of acute arthritis of the knee-joint with bilateral incisions, careful cleansing of the cavity, bilateral closure of the synovial layers with instillation of 10 c.cm. of colloidal silver, and closure of the aponeurotic layers with catgut sutures. The skin and subcutaneous tissues were not closed. The limb was then dressed and placed in a cast from hip to ankle, provided with windows for the observation of the wounds. In these 5 cases, cultures showed staphylococci in 2 cases, streptococci in 1, a mixture of staphylococci and bacilli resembling colon bacilli in 1. In the fifth case no organisms were found. All 5 subjects recovered complete use of the affected leg, although the duration of the process before treatment could be instituted varied from two to ten days.

The author reports 42 cases of acute suppurative processes observed by him during the past four years. Of these, 30 involved the knee. The ratio of males to females was 3:1, and the second decade appeared to be the interval of highest frequency. With regard to the pathogenesis, 33 per cent occurred as a result of penetrating wounds, 24 per cent as a complication of an acute osteomyelitis or other neighboring septic process, 9.5 per cent were secondary to remote foci, and 33 per cent were secondary to constitutional infection or to undetermined causes. The mortality in the first group was 7 per cent and in the second, 50 per cent; in the other two groups the mortality rate was considered less significant because of the rôle played by general factors. The diagnosis was made on the basis of pain, limitation of movement, elevation of temperature, and, objectively, by the exquisite tenderness to palpation, evidence of fluid, and the elicitation of pain on active and passive motion. Confirmatory evidence is obtained by aspiration. The importance of accurate diagnosis lies in the differentiation of the early, limited form from the process which has already extended to the periarticular tissues, authoritatively described by Payr.

Therapy, according to the author, rests upon two well founded principles: (1) that of immobilization, and (2) that of early drainage. He points out that the joint capsule, far from being a glass receptacle easily sterilized, is a cavity lined by a delicate membrane readily damaged by strong antiseptics. While acknowledging the value of the opinion held by Willems and others who advocate immediate mobilization of the affected joints in the hope of preventing fibrosis and ankylosis, the author believes that the best results are obtained by prompt evacuation of the cavity with subsequent rest, and contrasts the satisfactory results obtained by this method with the higher morbidity and mortality in the 42 cases treated by other methods. EDITH FARNSWORTH, M.D.

FRACTURES AND DISLOCATIONS

Reynolds, J. T., Zeiss, C. R., and Cubbins, W. R.: Compound Fractures. *Arch. Surg.*, 1940, 40: 844.

The specific aim of this analysis is to investigate the incidence of wound infection in compound fractures in two groups of cases. One group was treated by thorough sharp débridement, followed if necessary by cleansing of the interior of the wound with copious floodings of bland solutions, such as saline solution or soft soap U.S.P. (green soap) followed by saline solution. For the second group almost the same routine was utilized, the difference being that iodine and alcohol were introduced into the depths of the wound after it had been débrided, before closure and sometimes before débridement. A study of 131 conservative cases of compound fractures was made.

The authors emphasize that no two cases are similar and that even in a relatively large group, such as this one, there are enough varied factors almost to nullify the value of comparison of the therapeutic methods. There are rarely two wounds in the same region of a bone with equal amounts of comminution, equal amounts of contamination, and an equal amount of damage to the blood supply. The final outcome is also influenced by such factors as the age and general health of the patient and his ability to withstand the shock of the accident. The last-mentioned factor is rarely adequate in the average patient who presents himself for care at the Cook County Hospital. A large percentage of the high death rate, 31 cases, is accounted for by the poor general condition of the patients admitted to the Cook County Hospital and the delayed admittance following fractures. A summary of the causes of death is presented.

No uniformity of immobilization was followed. Buck's extension, skeletal traction with Steinmann nails, and plaster casts were employed. The authors' opinions vary from those who would recommend sewing the débrided wound layer by layer, tightly, as a clean wound, and those who would recommend irrigation of the open wound with a chlorinated solution designed to dissolve dead tissue, to those who would pack the débrided wound wide open with petrolatum gauze and allow the pack to be extruded from the base of the sound by the advancing walls of granulation tissue. Such diversity of opinion not only indicates the lack of an entirely satisfactory method, but emphasizes that whatever the method is, it is good in the hands of those who are familiar with its technique.

A wound which can be débrided properly is a wound which has been seen as contaminated but not yet infected. Careful excision of all contused tissue and removal of foreign material are done, the aim being to convert the area into a clean surgical wound. However, once contamination has occurred, it is doubtful that any débridement, however careful, can be ideal. One must picture a few lurking organisms in the depths of the wound. Nevertheless, the body tissues are in direct contact with the center of the wound; the tissue juices can pour into this area, and in the absence of necrotic tissue the local defensive mechanisms may attack these organisms and then allow normal healing of the wound to occur.

The authors base their avoidance of powerful antiseptics in the depths of the wound on a fact of comparative anatomy. In man the skin is able to withstand external trauma and has taken over the ordinary protective functions of the rest of the body. As would be expected, the underlying tissues, relieved of the necessity of protecting themselves from external violence, have diminished powers of self preservation and hence cannot tolerate contact with powerful antiseptics which do not harm the skin. Picture, then, a wound after careful débridement to which one has added application of iodine and alcohol. Alcohol is an excellent tissue coagulant, and this mixture of iodine and alcohol lines the wound with a layer of coagulated tissue proteins. Adding iodine and alcohol does not sterilize the interior of the wound; it injures the walls of the wound, and the bodily defenses now have to handle the layer of dead cells lining the cavity as well as to attack the organisms in the wound. The organisms, on the other hand, find themselves protected from the bodily defenses by the coagulated tissue and have time to gain a foothold. Such an apparently slight factor may decide whether the wound will remain clean.

An analysis of 88 cases is presented, in which after débridement half of the wounds were flooded with iodine and alcohol before cleansing and in the other half bland solutions as saline and U.S.P. green soap followed by saline solution were used. Infection developed in 18.1 per cent of the patients whose wounds were treated with iodine and alcohol, and 13.1 per cent of the patients whose wounds were treated without iodine and alcohol. The evidence that there is a greater percentage of infected wounds in those cases in which iodine and alcohol is used is explained on the assumption that the use of iodine results in the death of a sufficient number of cells to encourage infection.

ROBERT P. MONTGOMERY, M.D.

Sherman, W. O'N.: The Treatment of Compound Fractures. *Arch. Surg.*, 1940, 40: 838.

First aid in treating compound fractures should be directed toward reduction of the fracture by traction, protection of the wound with sterile gauze, and splinting with plaster, steel, or wooden splints. On the patient's admission to the hospital, anteroposterior and lateral roentgenograms are made.

At operation sterile gauze is placed in the wound and the surrounding skin is shaved and thoroughly cleansed with soap and water, ether, or benzine. The gauze is then removed from the wound and an adequate débridement of the devitalized skin, fascia, muscle, and detached bone is made. The débridement is of the greatest importance and should be done thoroughly. Wounds compounded from within are usually not as severe as those produced from without, nor is the contamination as great. The fracture is then reduced and immobilized by a splint, and the Carrel method of treatment of the wound is instituted at once.

Reduction of the fracture should be attempted by manipulation and manual traction followed by external fixation, preferably plaster. If internal fixation with plates and screws is used, a Thomas, Jones, or Cabot splint gives complete satisfaction in selected cases. Molded rather than circular plaster casts should be used, unless the latter are split within twelve hours, because of the possibility of complications due to constriction or gangrene. Repeated inspections should be made, and at the first sign of circulatory disturbance the splints should be released.

Should the reduction not be satisfactory an open reduction can be done after the local swelling has subsided and the temperature and pulse have become normal, which is usually at the end of ten or twelve days. The operative incision for fixation of the fracture with plate or screw is made, not at the site of the original compound wound, but at a point opposite, so as not to contaminate this particular field with the operative incision. The compound wound is permitted to granulate and is usually cicatrized before bony union has taken place. However, should a small sinus persist, the plates and screws are removed and the wound is closed.

A wound compounded from without should be treated as potentially infected, thorough débridement being performed at the earliest possible moment. The wound should remain open, and Carrel tubes should be inserted to every cavity and recess. Immediately after the operation the wound should

be copiously irrigated through Carrel tubes with a solution of sodium hypochlorite. At the end of two or three days the dressings are changed and new tubes inserted.

Steel plates and screws are usually employed for transverse fractures and transfixion screws for oblique fractures. Extensively comminuted fractures do not usually lend themselves to fixation by screws and plates and should be treated by skeletal traction, preferably with Kirschner wire. This wire can be incorporated in the cast in selected cases, but is not used routinely by the author because the introduction of pins or wires above and below the site of fracture increases the possibilities of complications arising from the use of this technique. Unless débridement and the Carrel wound sterilization are done thoroughly, plates and screws should not be used, as they tend to complicate the massive osteomyelitis which frequently results from infection. As a rule, if plates and screws are used, the wound should be left open. It is admitted that in some cases in which there is little or no swelling or trauma to the soft parts, closure of the wound can be done after internal metallic fixation, but such treatment should be undertaken only by surgeons of wide experience and sound judgment. If the slightest evidence of infection becomes manifest, the wound should be widely opened, plates and screws should be exposed but not removed, and the Carrel method should be instituted after one is sure that the tubes have been inserted in every pocket or recess. It is extremely hazardous to use metal fixation in compound fractures unless the wound has been carefully débrided and the Carrel treatment instituted immediately.

If vanadium steel is used in the treatment of compound fractures, 60 per cent of the plates and screws must be removed. The author usually removes the plates and screws if the wound is unhealed in from five to seven weeks after their insertion. A new stainless steel (chrome, 18 per cent; nickel, 8 per cent; molybdenum, 2.38 per cent; Rockwell hardness, C scale, 35 to 37) has been recommended in place of vanadium steel. It has all the physical properties of vanadium steel and will not corrode in the presence of sodium chloride or sodium hypochlorite solutions. It is much superior in physical properties to vitallium, which is objectionable because it is cast metal, is entirely too brittle, and contains air bubbles. This new alloy steel is the solution to the question of the use of metals when screws, plates, nails, and other metal fixative devices are used. They can be used over again. Metals such as monel and duralumin should not be used because of the tendency of the copper in the monel metal to corrode and because duralumin has a tendency to corrode and effloresce in the presence of saline solution. Electrolysis does not occur when like metals are used.

A concentrated solution of sodium hypochlorite (4.05 per cent) and sodium chloride (3.25 per cent) (hypochlorite N.N.R.) of a low alkalinity pH 11 is used in the Carrel technique. This solution is relatively stable, losing about 10 per cent of its active chlorine per year. The addition of 6½ parts of water to 1 part of the concentrate makes a solution of proper strength as to both sodium-hypochlorite and sodium-chloride content and is vastly superior to solutions made from sodium hypochlorite or liquid chlorine. The commonly used term "chlorinated soda" does not sufficiently specify the nature, quality, or content of sodium hypochlorite. This concentrate when diluted 6½ to 1 is hypertonic; it greatly increases the osmotic action and the flow of phagocytes and lymphocytes into the wound, and there is no danger of dehydration of the body.

A most scrupulous instrumental technique and most careful asepsis with attention to sound and generally accepted surgical principles must be adhered to if success is to be assured. The principles are simple and can be easily executed by surgeons and nurses who have received instructions, who have an understanding, and who are intent on carrying out the technique without alteration.

The author states that a visit by him to the clinic of DePage at LaPanne, Belgium, disclosed 80 patients with compound fractures undergoing treatment without a single infected wound. Sepsis and infection of wounds were completely controlled in injuries treated within the first six to eight hours. Visits to every other hospital, except for three where the Carrel method was carried out, revealed infection in every compound fracture treated between May and November, 1916.

The author's statistics in 11,127 cases showed amputations of 5 legs, 1 due to the loss of the soft parts, 1 to infection, and 3 to thrombosis and secondary hemorrhage with extensive destruction and crushing of the bone and soft parts. Eighteen amputations of the phalanges were done because of destruction of the blood supply and loss of the soft parts. There were no cases of sepsis and only 2 deaths, one from an embolus a few days following hospitalization and the other from shock following a reconstruction operation.

The results secured are ample evidence of the soundness of the principles employed. The author is not in accord with the methods being advocated in Europe, including the use of non-padded plaster, and the closed technique in treating compound fractures. He fully realizes that such methods may be necessary as a war emergency. However, he advocates that when time and environment permit, accurate reduction of the fracture, débridement and the Carrel technique with immobilization, either by plates or by splints, is the best procedure and is certain to bring about the best functional results in the shortest period, with a minimum of sepsis, amputations, and deaths.

Non-union is a more frequent complication in compound fractures than in simple fractures, but it is important that it be differentiated from delayed union. Application of an autogenous bone graft, either inlay or onlay, is usually the treatment of

choice. The graft should be firmly affixed to the host and immobilized by transfixion with two or four stainless steel (chrome-nickel-molybdenum) screws. After operation, plaster splints completely immobilizing the fracture should be used until union occurs. The Morton-Smart technique of graduated contraction of muscle should be instituted as soon as union takes place, as it not only restores muscle tone rapidly but increases the circulation to the extremity. If postoperative infection occurs, the wound should be opened widely and Carrel tubes inserted into every recess and cavity, the hypochlorite solution being injected every two hours until the wound is free from gross infection. If osteomyelitis or other infection has complicated the healing of a compound fracture, resulting in nonunion, the bonegrafting operation should be delayed from six to twelve months. Repeated bone grafts, two and sometimes three, are necessary in these cases before strong bony union is secured. The prolonged convalescence could have been materially reduced had the initial treatment of débridement, immobilization, and the Carrel method been instituted. ROBERT P. MONTGOMERY, M.D.

Orr, H. W.: The Treatment of Compound Fractures, with Special Reference to Military Surgical Procedures. *Arch. Surg.*, 1940, 40: 825.

Any method of treatment for compound fractures to be most effectual must not neglect the absolutely essential fundamentals of immediate reduction of the fracture, drainage for infected wounds, immobilization in correct position, and control during repair of the fracture. Restoration of the circulation and nerve supply, and provision for rest to favor physiological function in injured and inflamed parts must not be neglected as they were in the World War.

The author repeats a program as proposed by him in 1923 as follows:

1. Prior to any operation in a case of chronic osteomyelitis or of compound fracture, immobilize the patient on a traction table with all of the injured parts as nearly as possible in correct anatomical position. Reduce the fractures at once, especially by efficient traction, so that the circulation and nerve supply are restored. If there is an older deformity, correct it first by traction and manipulation. Even in seriously injured patients with multiple fractures or extensive injuries to the thigh, shock may nearly always be avoided by preliminary control of the patient in this way. If a patient arrives at the hospital in shock, employ the customary medication—dextrose solution given intravenously, physiological solution of sodium chloride given hypodermically, or blood transfusion. However, do not leave him with a mangled limb unreduced and tortured by painful movements and muscle spasm. Efforts to relieve shock (shock therapy) are often futile if the local conditions that cause so much suffering are not relieved.

2. Open the entire infected area and drain by a suitable operation (débridement), so that foreign material and dead or dying tissue are removed. As part of the drainage operation the wound may be wiped out with pure tincture of iodine and alcohol, as in preparation of the skin, in order to reduce the amount and virulence of the accidental infection.

3. To protect the surface of the wound and provide permanent drainage, fill the wound with a nonabsorbent, non-irritating petrolatum pack. (This is the open wound treatment that has prevented gas-bacillus infection in so many cases.) Use no drainage tubes, and do not cover any parts of the wound by flaps, sutures, or overhanging portions of tissue. The pack must be carried to the depths of the wound and it must flow over the edges at the top to a distance of about 1 in. (2.5 cm.) on the surrounding skin. This is to carry discharges away from the area just around the wound. Complete the dressing with a dry, sterile absorbent pad bandaged firmly over the drainage pack and its edges.

4. Enclose the entire limb in a plaster-of-Paris cast. In cases of fracture and after the correction of deformities, incorporate in the cast the moleskin adhesive plaster, ice tongs, traction pins, or pins extending directly into the fracture fragments. This makes permanent the traction and fixation obtained on the table during operation. Casts must fit well and be sufficiently extensive to overcome muscle spasm and irritative motion of all kinds once and for all.

5. When removal of a severely injured limb is indicated or even definitely impending, wait, if necessary, for improvement in the patient's local or general condition; but lest this waiting be unprofitable, relieve pain, shock, and infection by immobilization of the limb in correct position and by adequate drainage while other supporting measures are employed.

6. Finally, do no postoperative dressing. If immobilizing devices become inefficient, if discharge is profuse, or if odor (because of mixed infection) becomes unendurable, change dressings in the operating room without disturbing the parts and with a minimum of damage to the surface of the wound. Usually the original dressing may remain in place for from four to eight weeks, or even longer, until the wound has made good progress toward healing.

If such a program is to be adhered to, a number of misconceptions must be laid aside.

1. The misconception that primary treatment must be delayed to allow the patient to recover from shock, hemorrhage, or swelling. The fact is that all of these conditions may be prevented or relieved by immediate reduction and control of the injured parts in correct length and position. With reduction of the fracture there is restoration of the circulation and nerve supply; hence all of the physiological functions in the injured part may be expected to improve.

2. The misconception that every injury is an individual problem to be solved by the particular surgeon attending in each case. This is a general teach-

ing which has done much harm. Adherence to a routine calling for reduction of the fracture and control of the limb will soon convince any surgeon that there are certain rules that are applicable to every case, regardless of time, place, or circumstances.

3. The misconception that plaster-of-Paris cannot be used in the treatment of fractures because it implies constriction of the limb and will do harm by interfering with circulation. No properly applied plaster-of-Paris cast is tight enough to cause constriction of the limb or distress. A painful cast is an improperly applied cast. When a cast including fixation pins has been applied, immobilization in correct length and position is "un fait accompli." On modern traction tables, reduction of the fracture, suitable drainage dressings, and a correct plaster-of-Paris dressing with skeletal fixation may all be effected quickly, without difficulty or delay.

4. The misconception that infection must be combated by active chemical antisepsis and therefore that splints must be adjustable or removable. It is too often forgotten that when Lord Lister introduced the antiseptic method he placed his chief reliance on exclusion of infection from the wound and on the patient's resistance to overcome local and systemic infections. Lister advised repeatedly against the application of phenol and other chemicals directly to the surface of the wound. He warned also against the introduction of infection at the time of making dressings and the distribution of infection by metastasis. Frequent dressing, by whatever method, violates the principle of protecting the surface of the wound and the patient against secondary infection. Even such a method as the introduction of maggots every few days subjects the patient to greater risk of mixed infection than does an irrigation or an antiseptic dressing.

5. Mechanical cleanliness of the wound is unnecessary. It is specific infection, and particularly mixed infection, that does the damage in these cases. If the patient can have his original damage and infection minimized by an adequate primary surgical procedure and if he can then be protected against irritation from movement, muscle spasm, and frequent dressings, he will usually be able to defend himself. This is true especially if correct anatomical relations and physiological function have been restored to the injured extremity.

6. The misconception that fractures cannot be reduced secondarily or deformity corrected in the presence of infected wounds. The author states that during his military service with the British Army twenty-two years ago, he was taught that compound fractures must be soundly healed for several months before any surgical procedures could be attempted. Procedures to correct fracture deformities or non-union and even operations on the peripheral nerves had to wait, not only until healing had been obtained (often it never was obtained), but until the scarred region would withstand a period of massage without "lighting up." Now it is known that under the conditions described, that is, drainage when necessary, anatomical reposition, perfect immobilization, and protection against infection both at operation and afterward, any of these operations may be done at any time. To do such operations without delay is especially important when control of a fracture has been lost or when deformity is impending or has occurred. In this way long periods of disability and deformity are prevented. Moreover, many patients will heal early, with good limbs, who would go through much longer periods of healing if their deformities and other pathological conditions remained unrelieved.

The experiences of the author and other competent observers who employed these principles in 1,000 cases in the late Spanish war show that good results may be obtained in from 85 to 90 per cent of compound infected fractures of all kinds by the infrequent dressing method. Leaving the wound open is a factor of importance in dealing with all the anaerobic infections. That the petrolatum pack and the cast exclude oxygen from these wounds is erroneous.

The points for consideration in both civil and military practice are as simple as they are important:

For first aid on the battlefield or at the scene of the accident the use of a tourniquet and traction immobilization in a Thomas splint have demonstrated their value as life-saving and limb-saving expedients. Prepared in this way, the patient may be transported safely to a hospital where more efficient traction, débridement, petrolatum pack drainage, and fixation in a plaster-of-Paris cast may all be done.

The same technique is to be applied whether the treatment is primary, that is, applied during the first few hours, or secondary, in the sense that the patient arrives with the fracture in malposition, the wound infected, and septicemia and pyemia already established. A restless patient with an unreduced fracture, muscle spasm, pain, and a septic wound can do himself far more harm every hour than the surgeon will do by a thirty-minute maneuver, after which the compound fractured limb will be permanently immobilized in correct position, the wound adequately drained, and the surface of the wound and the limb fully protected against further trauma and infection. ROBERT P. MONTGOMERY, M.D.

Kwedar, A. T., and Mitchell, C. L.: Late Rupture of the Extensor Pollicis Longus Tendon Following Colles' Fracture. *J. Bone & Joint Surg.*, 1940, 22: 429.

Seventy cases of "spontaneous" or late rupture of the extensor pollicis longus tendon, following fracture of the lower end of the radius, have been reported in the literature. The authors report in detail another case.

A forty-four-year-old woman fractured her left wrist and twenty days later noted inability to extend the thumb. Five weeks later the tendon was repaired and a 2 in. defect between the tendon ends was overcome by splitting the proximal segment. This operation was unsuccessful and a month later a

tendon graft was performed and an excellent result obtained.

A review of 50 cases from the literature show this rupture to be more common in females, in a ratio of 6 to 4. The greatest incidence was between the ages of twenty-one and forty years. The average latent period between the time of fracture and occurrence of tendon rupture is six weeks. The symptoms and diagnoses are reviewed.

Trauma at the time of a Colles' fracture is the predisposing cause of rupture and at that time the tendon may be partially severed, or, more probably, the blood supply of the tendon is interfered with by direct injury to the vessels by pressure from hemorrhage, or by scar-tissue formation later. The direct cause of the rupture is a sudden flexion or extension of the thumb. At operation the tendon is found to be frayed and either end may be attached to the periosteum by scar tissue. In the authors' case the biopsy revealed chronic inflammatory changes in the end of the tendon with evidence of old hemorrhage.

The prognosis is good in operative cases. Spontaneous recovery of useful function of the thumb cannot be expected.

The ideal treatment is end-to-end suture of the divided tendon. If the proximal segment has retracted under the dorsal carpal ligament this must be divided and the end found. The tendon is not replaced in its groove. The normal oblique course of the tendon may be attained by passing it through a fascial pulley. The authors attempted to preserve the obliquity by suturing subcutaneous fat about the tendon, but this did not hold; however, a satisfactory result was obtained.

If the proximal stump cannot be found the distal segment may be attached to other tendons to the thumb or the extensor of the wrist. When a gap exists between the stumps either lengthening of the tendon or tendon grafting is required.

HARVEY S. ALLEN, M.D.

Boehler, L.: Evolution of the Treatment and Clinical Evaluation of Vertebral Fractures (Wandlungen in der Behandlung und Begutachtung von Wirbelbruechen). *64 Tag. d. deutsch. Ges. f. Chir.*, Berlin, 1940.

Ever since the time of Hippocrates, attempts to reduce fractures of the vertebra have been made. The results, just as after the reduction of every type of fracture, have been good only when a sufficiently long and uninterrupted period of complete rest followed the reduction. In 1929, Davis presented the first reduced fractures of the vertebra which had healed in good position. Since 1930, Boehler has practiced reduction followed immediately by special exercises. Reduction is most successful on the first day. If the proper plaster jacket is applied immediately thereafter and left on for from three to six months, on the average for four months, the vertebral bodies which have been straightened out will no longer collapse. The results following this type of treatment are extremely good because form, mobility, and strength are usually restored. Of the patients covered by insurance, 93 per cent no longer received compensation at the end of two years. Magnus is an opponent of reduction. Of his patients, only 21 per cent no longer received compensation after two years, and after six years only 45 per cent no longer required compensation.

Boehler differentiates four types of vertebral fractures with paralysis:

1. Fractures without displacement, in which the paralysis is produced as the result of concussion, hemorrhage, or edema. This type of paralysis disappears spontaneously.

2. Fractures with severe dislocation in which the vertebral arch is retained. In these cases the spinal cord has been severed by compression. Reduction is therefore hopeless.

3. Dislocation fractures with unilateral or bilateral fracture of the arch in the interarticular portion. In these cases the spinal cord is only compressed but not severed, because the vertebral arch has become widened. It is only these cases that should be reduced by the closed method, and then only after preceding light longitudinal traction on the arms and legs in the dorsal plane. The prognosis or cure in these cases is extremely good.

4. Dislocation fractures with comparatively slight displacement and with impaction of the articular processes. In these cases, also, the spinal cord is usually spared. They permit of reduction in the dorsal plane after preceding partial resection of the articular processes.

In the discussion LEHMANN reported his experiences with the Boehler treatment of vertebral fractures. He believes that comparison of the functional method (Loebcker and Magnus) with the treatment of Boehler is not proper, as the method of Boehler (by means of the application of a plaster corset) is indeed also a functional method. To be sure, this corset at once passively fixes the lordotic posture. On the other hand, however, if this plaster corset is constructed in the manner in which it usually is done at the Rostock Clinic (the axillæ are allowed to remain free while the anterior sternal portion of the corset lying firmly upon the sternum is carried on up to the level of the jugular veins, which causes the broad anterior projection of the plaster corset to act as a monitory bandage), the lordotic posture is further aided by active muscular exertion, if the injured person would avoid unpleasant pressure upon the neck. In addition to this, the patients, after having been fitted with plaster corsets which have become firmly fixed, are immediately sent to playgrounds and to gymnasiums where they take part in boxing, javelin throwing, and football. As for the actual exhibit, Lehmann showed a film which demonstrated that, for the purpose of correcting the usual type of wedge-shaped vertebra into any form of lordosis, the simple suspension sling or the pulling up of either the upper part of the body or the legs suffices. This form of treatment, however, is insufficient in the luxation fractures associated

with injuries of the posterior surface of the vertebral bodies and anterior displacement of one of the fragments in the direction of the spinal canal. In these cases, if an attempt were made to straighten out the injured posterior margin of the vertebra by means of suspension, the compression would be still further increased and the fragment would be driven into the vertebral canal. It was shown, by means of the model exhibit, that this danger could easily be avoided by employing extension (Glisson sling at the head and extension traction on both legs) before using the suspension sling. Up to the present time, Lehmann has encountered no complications during the process of reduction. He regards it as possible that his success is to be attributed to the method used.

He reported 30 cases. In one-half of those which were reduced the original result was not retained as the vertebræ collapsed again; however, in none of the cases were the resulting conditions worse than those found at the time of admission. In 25 of the cases reduction was unsuccessful either because associated injuries were present or because there was great delay before treatment was instituted. In some cases the treatment by means of the plaster corset had to be abandoned after a short trial because of circulatory disturbances (coronary sclerosis).

In those cases in which the spinal cord was also involved, reduction was undertaken. If the paralytic phenomena persisted, the patients were placed on a plaster bed, which produces better fixation than the Rauchfuss suspension sling. All the patients in whom reduction was successful and could be retained had functionally good results, i. e., they were free from pain and able to move. Of the patients in whom, after the initial reduction, the vertebra again collapsed, only one-half had good results; the remainder showed limitation of motion. However, the results were also remarkably good in the cases in which reduction was unsuccessful, which shows that not in all cases does good function and freedom from pain depend entirely upon the successful anatomical restitutio ad integrum of the injured vertebra. It should not be forgotten, however, that the patients whose vertebræ heal in poor position suffer with spondylopathia deformans later, even though they may not have any complaints at first. The relationship between the symptoms resulting from the latter and the original accident can no longer be denied. The reproach which Erlich recently expressed, and which to-day was also expressed by Buerkle-de-la-Camp, against the Boehler plaster-corset treatment —that it has a psychically unfavorable effect upon the injured patient—cannot be shared by Lehmann; he has, rather, the opposite impression. At any rate, the injured were not treated with the plaster corset longer than from eight to ten weeks at the Rostock Clinic, and not for one-half year as Buerkle-de-la-Camp asserts. Lehmann believes that he can manage with ten weeks of treatment by means of the plaster corset. The previous experiences with the Boehler method of reducing the fractured vertebra and the institution of active exercises in the plaster corset encourage Lehmann to continue further in the same manner.

BECKER, who in 1938 wrote in favor of the Boehler method of treatment of vertebral fractures on the basis of 6 cases of his own (*Muenchen. med. Wchnschr.*), reports 1 failure. The case was a compression fracture of the first lumbar vertebra, sustained as the patient was struck in the back by a locomotive. By means of ventral suspension there was complete reduction of the compressed vertebra to the point of gaping of the fracture line. In spite of the fact that a window was made in the back of the plaster bed, decubitus developed, which led to death in four weeks. Attention was called to the importance of this back window, which can be widened extensively without endangering the plaster bed.

In 1931 SOMMER had undertaken the method of treatment recommended by von Brunn and Magnus in Dortmund, because this method, as described by Magnus, seemed to him to have been given sufficient trial and was completely satisfactory for the treatment of the accident cases occurring in the Ruhr coal region. Among 98 cases of definitely proved cup and wedge fractures of the thoracic and lumbar spines, 12 with an associated paralysis of the bladder, rectum, and both lower limbs were reduced. All of these patients died within a period of from fifteen to five hundred days as a result of pyelonephritis. The remaining 86 patients in whom the fractures were not reduced were able to return to work again after an average period of treatment of one hundred and twenty-four days; one-third of these were engaged in heavy mining activity, another third were engaged in moderately heavy work, and the last third were engaged in light work. After two years 20 per cent were receiving compensation, and after four years none was still receiving compensation. Especially when the ability to work and the economy of materials are the demands of the hour, does the method of von Brunn and Magnus seem to Sommer to have all the advantages as far as his own particular group of patients is concerned.

VON DANCKLEMANN reports repeatedly concerning vertebral fractures resulting from the effects of mild external forces. These fractures are not particularly rare. In one year 4 related observations were made: vertebral fracture resulting from the slipping of a heavy table, from the patient's slipping on the house floor, from the patient's partaking in a trotting race, and from a small jump without a fall, executed by a beginner in skiing. A fracture of a transverse process occurred in the attempt to place the heel on the shoulder. These fractures occurred because of failure of proper muscular regulation resulting from surprise or insufficient practice (beginners in sports). The body masses set in motion by external stimuli furnished the destructive force. A disregard of these circumstances in 1 case led to a lengthy suit for compensation.

Up until the present time basic and continuous researches concerning the healing of injuries of the

spinal column, especially of vertebral fractures, have been reported by LOB. The researches were made by means of animal experimentation. As far as the conditions in man are concerned, entirely too much dependence has been placed upon parallels drawn to the healing of fractures of the long bones. The circumstances in injuries of the spinal column are quite different from those existing in injuries of the long bones. The examination of a large number of spinal-column preparations taken at every period of the healing process and from all forms of fractures has shown us that very special circumstances exist in the course of healing of even the ordinary type of vertebral fracture. It has been possible to demonstrate that the simple fracture resulting from a compressing impact is accompanied by an impaction of the spongiosa system which provides favorable conditions for weight-bearing ability and for later healing. Since the formation of callus of periosteal and endosteal character is very slight and takes place comparatively slowly, every attempt to loosen the impaction would endanger the conditions necessary for healing. Goecke has shown that the weight-bearing ability of the impacted type of fracture is surprisingly good. This changes, however, just as soon as the impaction has been dissolved and the spongiosa portion of the fragments has been pulled asunder. Lob was able to show in animal experiments that defects in the vertebral bodies do not heal at all because, even in animals, the endosteal and periosteal callus formation is a comparatively light one. He states that when we consider the fact that even in a simple impaction fracture, there exist special conditions, we can realize that this is true particularly in those forms of fracture in which, because of the wedge-like action of the ligamentous attachments of the Gallert nucleus, which becomes prolapsed into the fracture cleft, special difficulties arise. The prolapsed ligamentous attachments of the intervertebral discs are not replaceable; this we have been able to see in our studies of preparations of the human spinal column. This tissue remains lying in the tears and clefts or else in the depressions resulting from the fracture, and produces exactly the same conditions as does the interposition of soft tissues in the case of fractures of the long bones. The tissue which has become prolapsed into the body of the vertebra itself further hinders the already sparse endosteal callus formation and produces pictures similar to those one sees in a tight pseudarthrosis. Even after a period of years one can still find the ligamentous attachments of the intervertebral discs, which have undergone degenerative connective-tissue changes in the fracture spaces.

Since very many examinations depend entirely upon the roentgenogram and the roentgenogram is not always correctly interpreted as far as the condition of the intervertebral disc is concerned, it is no wonder that the true state of affairs frequently remains unnoticed. This is true in spite of the fact that we are dealing with an extremely important factor which in itself is capable of explaining the poor results following the reduction of vertebral fractures and also the differences in the requisite length of time necessary for the various methods of treatment (Magnus and Boehler). For it is obvious that a fractured vertebral body, which has regained its external form and is permeated by the ligamentous tissue of the intervertebral disc, must necessarily collapse again when subjected to too early weight-bearing, especially because the fractured lateral arches and articular processes have not yet undergone bony union. The unreduced vertebral fracture, on the other hand, has a poorer position, but, nevertheless, there are static conditions which from the very beginning are more amenable to the assumption of weight-bearing without further collapse.

Especially interesting is the case of Wachs which was reviewed by Boehler in support of his own views. This case was that of a reduced vertebral fracture in which the prolapse of intervertebral-disc tissue into the inner portion of the vertebral body could be plainly seen. In spite of the fact that the posterior wedge fragment still encroached upon the spinal canal as the reduction had in no way altered this condition, this vertebral fracture is by no means to be designated as healed. The histological preparation plainly showed nuclear tissue in the fracture spaces but did not show any firm bony union of the fracture fragments. This case, therefore, is a proof of the correctness of the point of view, that in spite of the reduction, the intervertebral-disc tissue remains lying in the fracture spaces, and later on when the vertebra is subjected to weight-bearing, a collapse of the vertebral body may be expected. Since the injured person in this case was paralyzed, it was impossible to obtain counterproof to this assertion, that the vertebral body had been able to withstand later weight-bearing. From this point of view also, therefore, the case of Wachs cannot be used to prove the validity of Boehler's argument. The spur formations and projections which were previously regarded as periosteal-callus bridges occur only, as has been proved, in those cases in which the intervertebral-disc tissue has prolapsed either laterally or anteriorly. Therefore in these cases we are dealing, not with evidences of healing of the actual vertebral fracture, but rather with a bony metamorphosis of the prolapsed intervertebral-disc tissue, i.e., with evidences of healing of the intervertebral disc itself. These assertions were further elucidated by numerous pictures.

MAGNUS emphasizes the fact that in these cases we are dealing with two completely different indications, paralysis and correction of the gibbus. Among the causes of the paraplegias, Boehler has left one unmentioned, namely, the hemorrhage from the site of the fracture into the vertebral canal, which leads to a compression of the spinal cord. This transverse paralysis may frequently be recognized by the fact that it first makes its appearance after the patient has been admitted to the clinic. It most certainly recedes independently of the type of treatment.

There are even paraplegias which recede spontaneously. Magnus referred to a previous series of 56 cases, of which 3 healed completely and 5 healed with only minute remnants of the previous paralysis. In his clinic at Munich, in addition to 2 cases of transverse paralysis which receded spontaneously, he reduced 12 cases of paraplegia according to the accepted manner; but in spite of this, none of these was remarkably improved. Magnus then showed a table in which the purely functionally treated miners were compared with those who had been treated elsewhere by the old method and had worn corsets. In the latter group the time of hospitalization and the amount of compensation paid was almost double that of the former. Further attention is called to the fact that the amount of compensation paid decreases rather rapidly in the cases treated functionally, whereas in the cases in which corsets are worn the amount of compensation remains high (corset cripples).

From the table of Boehler, it is shown that the period of treatment is at first from four to eight weeks and finally from four to six months, and to-day mention is made of eleven months. This represents a heavy burden for the corset wearers. In contradistinction to this, the functionally treated patients returned to work after a period of four months, a period of treatment similar in length to that mentioned by Sommer.

Another table taken from the statistical review of Haumann, reveals facts relative to the compensation question. It is certainly not true that those who have a residual gibbus receive a particularly high compensation. Age, fragility, lack of coöperation, and even intent to defraud all play a part. Formerly Magnus assumed that vertebral fractures treated by the functional method did not tend to collapse later. Today he no longer maintains this viewpoint; however, the cases in which collapse occurs are quite rare. The reduced cases may also collapse later and, indeed, in apparently larger numbers. Magnus does not regard it as a misfortune that two different methods exist for the treatment of vertebral fractures. However, he believes that the method of treatment of Loebke and Brunn, even after today's arguments of Buerkle-de-la-Camp and Sommer, is still the proper method for the workers of the industrial region.

Haumann states that they have reduced fractures of the vertebra of a pronounced wedge-like form according to the method of Boehler, but, on the other hand, they have abstained from the reduction of mild vertebral fractures. The reduction of those fractures of the vertebra which have a marked wedge-like form yields very good results in the lumbar and lower thoracic regions. However, the righted vertebral body frequently shows a poor tendency to heal. When the plaster cast is removed in these cases, considerable evidence of injury still remains. Among the most important findings are: (1) reduced weight-bearing ability of the spinal column, (2) complaints of a subjective nature, and (3) poor mobility of the spinal column. Haumann believes the fractured and, as a result of the reduction, the pulled-asunder spongy bone evidently does not always possess the requirements for healing. The unfavorable healing conditions in fractured spongy bones in general is well known, but in the spinal column these conditions assume a particularly unfavorable form; in mild vertebral fractures the endosteal and periosteal bone formation, which in itself is rather poor, suffices for the achievement of healing. On the other hand, in the badly compressed fractures which have been pulled apart as the result of reduction, this bone-forming activity does not always suffice to produce a solid healing of the vertebral bodies. Further complicating factors are represented by the relationship of the intervertebral disc and the nucleus pulposa. These conditions explain the fact that treatment by means of the plaster bed frequently has to be extended beyond a period of five, six, or even seven months. The disability is therefore greatly decreased as the result of a decreased weight-bearing ability and limited mobility of the spinal column. These conditions also explain the matter of the subjective complaints which often make it difficult for the sufferer to again accustom himself to the process of working. Much better results are obtained when similar types of fracture are treated by the functional method. The compressed vertebral body retains its wedge shape. This fact is very frequently to great advantage, because as a result of this the vertebral body can heal firmly. To be sure, the direction of the axis is disturbed at the site of the fracture, but the weight-bearing ability of the spinal column and its function, on the other hand, are for the most part restored. Although it is true that with the Boehler method of reduction the direction of the axis at the site of the fracture is restored, nevertheless the weight-bearing ability and the function of the spinal column are often extensively disturbed. Therefore, the ability of the functionally treated patient to work, returns much earlier, and his acclimatization to the industrial process creates no difficulties. The nerve injuries, as far as the spinal cord is concerned, are by no means always favorably influenced by the reduction. Indeed, many times they are made worse, just as we have heard from Buerkle-de-la-Camp.

The injuries to the spinal cord are frequently caused by the posterior superior quadrant of the vertebral body and by a fragment of bone which has become separated in this region (shearing fracture). Because of the fact that the anterior portion of the vertebral body is crushed together by a blow as a result of the fracturing force, a bone fragment becomes detached from the upper posterior quadrant. It happens, therefore, that this bone fragment is not displaced into the vertebral canal when reduction according to Boehler's method is undertaken, but is immediately driven into the spinal canal at the time of the injury; Haumann has frequently seen this phenomenon at autopsy. He is of the opinion that the separated bony fragment is displaced still

further into the vertebral canal during the course of reduction. Although the occurrence of cord injuries, caused by the separation of the bone fragment from the posterior superior quadrant of the vertebral body, is not rare but rather characteristic, nevertheless, the observation (which is described in Haumann's book entitled "Vertebral Fractures and their Results") of a case in which the separated bone fragment of the inferior posterior quadrant had become displaced into the spinal canal is of the greatest rarity.

Paraplegias, the origin of which may be attributed to hemorrhages into the spinal canal, may recede quite extensively following the functional form of treatment just as well as after the employment of Boehler's reduction method of treatment. As to the problem of the reduction method of Boehler, the chief concern is with the cardinal question: Does the reduced vertebral body always regain sufficient firmness? This question cannot always be answered in the affirmative on the basis of the clinical experiences. On the other hand, it is not a matter of question but rather a fact, established through decades of experience and confirmed by numerous autopsies, that the wedge-shaped, compressed vertebral body insures an ivory-hard permanent healing. It is our duty to restore our patients and to return them again to work by means of the best, most certain, and quickest possible method. With the material at our disposal we have been able to accomplish this, not by means of the Boehler method, but rather by means of the functional method of treatment.

JOERG can make no comments as far as the purely specialized surgical arguments are concerned. He gives a report simply about his personal experiences, which he underwent as a patient treated by the Boehler method, as well as observations that he had made with 12 other patients treated by this method. He himself had sustained a compression fracture of the third lumbar vertebra during a forced landing with a pursuit plane in enemy territory during the Polish expedition. Following this he had to go on foot across the Carpathian mountains for two days and two nights, and it was twelve days after the accident when he came into Boehler's hands. He was treated by immediate reduction in ventral suspension, by which the gibbus was corrected and the physiological lordosis was increased. A plaster cast was applied. Immediate ambulation was permitted and Boehler gymnastics were prescribed. During the so-called vertebral gymnastic hour, he made the acquaintance of about a dozen patients suffering with injuries of the spine, some of whom were already carrying out their prescribed gymnastic exercises while they were still wearing their plaster casts, while others had already discarded their casts. These patients were all questioned about their conditions. Without exception they were full of praise for the treatment, and Joerg heard no complaints from a single one of them concerning the disadvantages of the Boehler method of treatment such as those which have been mentioned in the discussion, viz., the burdensomeness of the cast, restricted mobility after its removal, relatively long duration of the illness, and psychic depression. He himself had no complaints to make. Indeed he was able, while the cast was still in place, to perform clinic service (including the performance of operations), and has had no complaints of any kind either while wearing or after removal of the plaster jacket. Further, he experienced a physical sense of well being and regarded himself as particularly fortunate in that he was permitted to get up immediately. From the point of view of the patient, Joerg at any time would again gladly trust himself to the Boehler method of treatment. (Upon request there followed several gymnastic exercises: a hand stand, touching the floor with closed fists while the legs remained completely erect. Later x-ray films of the fracture site were shown.)

At the Surgical Congress held two years previously, KOCH had reported that the Boehler method of reduction of vertebral fractures had been employed in about 100 cases of fresh vertebral fractures, occurring in miners, treated at the Bergmannsheil Hospital II, in Buer i.W. up until 1938. Even at that time he had asserted that this method had become the method of choice in his hospital for the treatment of certain types of fresh vertebral fractures. During the interval, i.e., up until the present time, he has reduced about 135 fresh vertebral fractures completely according to the method of Boehler, and has carried out the after treatment as prescribed by Boehler, without experiencing damage of any kind in even a single patient after reduction of the fracture by this method. In the course of the treatment, all of these patients had been subjected to a neurological examination by the neurological department. It is essential that, in carrying out the Boehler method, the directions given by Boehler are followed exactly. During the past two years the cases suitable for this method were selected with great accuracy. All of the mild fresh vertebral fractures belong in this group; hood fractures and fractures with separation of a bone fragment were not treated by this method. Also, all of the very severe cases, i.e., those cases in which an undeniable transverse injury of the spinal cord resulted from a fracture of the vertebra (occurring in miners), were not treated by the Boehler method, because experience had shown that unfortunately no favorable change in the sad condition of the patient could be obtained even by this method of reduction. All other types of fractures, those with a marked wedging of the vertebra, and those with external evidence of a marked change in the form of the spinal column, in other words, all severe wedge fractures of the lumbar and lower thoracic spine without associated injuries, were treated immediately by the Boehler method and later exactly according to the concepts of Boehler. The results were good, at any event, without failures, and, also, the rate of compensation for these injuries could later be placed at a lower

level than that for cases which were not treated by the Boehler method. In none of the cases treated by this method, were psychic disturbances observed. The Boehler method remains the method of choice of Koch for the treatment of fresh vertebral fractures occurring in miners, provided the afore-described selection of cases is observed.

Further discussions are made of the social as well as of the human elements of vertebral fractures, especially those associated with transverse lesions. Here, to be sure, the surgical knife has no place. However, the employment of many other types of surgical methods, in the after-treatment of these pitiful victims of industry, has attained the greatest significance in our lives. For this reason we exert ourselves to search for ways and means even outside of the realms of pure surgery in order to prevent the occurrence of vertebral fractures in the miner. We are even now, together with professional miners, engaged in testing appropriate preventative measures. (L. BOEHLER) HARRY A. SALZMANN, M.D.

Bader, L., and Gui, L.: Osteosynthesis with a Screw in Fracture of the Neck of the Femur (L'osteosintesi con vite nelle fratture del collo del femore). *Chir. d. organi di movimento*, 1940, 25: 321.

The screw developed by Putti is described in great detail and is the subject of profuse illustrations and diagrams, alone and *in situ* in the femur of the cadaver. The screw was subjected to various mechanical stresses and strains by itself, and then the experiments were repeated and elaborated with it in place in a femur. The results were tabulated and analyzed, and the following conclusions were drawn:

The screw is capable of compressing the proximal fragment so as to permit an efficient impaction of the two fragments, without compromising the stability of the osteosynthesis. The fracture of the femoral neck treated with the Putti screw possesses a higher resistance to external forces than the values obtained by Kortnetz experimenting with the Smith-Petersen nail. Fractures treated by this method have also a remarkable resistance to external rotating forces acting upon the diaphysis.

FRANK MCDOWELL, M.D.

Magnuson, P. B.: A Report of 59 Consecutive Cases of Ununited Fracture of the Neck of the Femur. *Surgery*, 1940, 7: 763.

In 41 of the 59 cases reported, the author's modification of the Brackett operation was used; there were 7 Whitman reconstructions, 5 high intratrochanteric osteotomies, 2 Colonna operations, and 4 procedures which could not be classified as any definite operation.

Females predominated in a ratio of 3:1. The average time between the injury and the operation was eighteen months. The average shortening before operation was 1½ in. and following operation it was ¾ in.

In the selection of the operative procedure the individual surgical risk involved for the patient is one of the major considerations. The author's modification of the Brackett operation has not been shocking. High blood pressure was not considered a contraindication. Obesity complicated the mechanical difficulties, but it is not in itself a contraindication. Avertin with nitrous oxide was the anesthetic of choice and was used in all these cases. There were 2 deaths in the entire series, including all types of operation, a mortality of less than 4 per cent. The operating time varied from forty-five minutes to one hour and ten minutes.

The basic principle to be fulfilled in this procedure is to reëstablish normal weight-bearing between the shaft of the femur and the acetabulum. Whether the head should be interposed in one way or another depends largely upon its condition as seen at the time of the operation. It is impossible to determine whether the head is viable or not solely with the roentgen rays. The type of operation is not decided upon until the fracture is exposed and the head, the remainder of the neck, and the upper end of the femur are inspected. In many cases in which the x-rays show necrotic areas and one would suspect that the head was at least partly necrotic in the sense of lacking circulation, it has been found that, if put to work, the head will bear weight and function normally. Even after a period of nine years of such apparently normal function, the x-rays have shown the same necrotic areas. The author judges whether the head shall be removed or shall be put to work, at the operating table, without any definitely preconceived idea of what operation will be done.

If the head is firm and can be freely moved in the acetabulum after the fibrous tissue is thoroughly dissected away from the fractured surface and the rim of the acetabulum, or if there is any bleeding from the fractured surface of the head after the fibrous tissue is thoroughly removed, the head is fitted over the end of the shaft of the femur in the way described previously (Magnuson, P. B.: Repair of Ununited Fracture of the Neck of the Femur, *J. Am. M. Ass.*, 1932, 98: 1791). The author believes that, if the head is brought into wide contact with the upper end of a well nourished shaft and held firmly between that shaft and the acetabulum, the circulation is restored sufficiently to allow the head to function. The cartilage of the head and the cartilage lining the acetabulum must also be free from adhesions, and, although there are frequently areas of erosion in this cartilage, the head will bear weight painlessly and remain freely movable. The cartilage should be examined as carefully as possible by rotating the head, but not completely displacing it. There must be sufficient capacity in the remaining head to allow excavation of proper size and shape to receive the upper end of the shaft. The fibrous tissue which frequently completely binds the head to the acetabulum must be removed to allow absolutely free motion of the remaining head. If this is not done, the shaft will pry out of its new position. To assure success, it must be possible to place the

Fig. 1. Second stage of reconstruction of hip. a, Large mass of fibrous tissue between head and trochanter removed; b, line of incision for removal of trochanter; c, hollowed-out head and rounded end of shaft, the curves of which correspond.

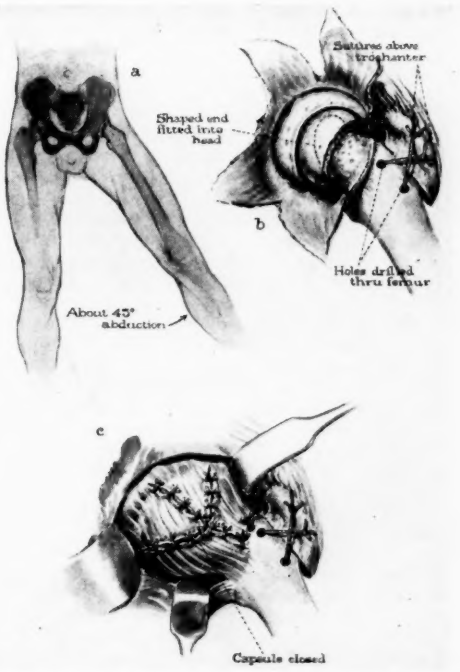

Fig. 2. Third stage of operation. Rounded end of shaft fitted into hollowed-out head; trochanter replaced downward and outward from its original location. a, Position of shaft in head at completion of operation; b, head hollowed out in the form of a parabola, with the end of shaft fitted into it and the trochanter attached to the upper end of the femur below and lateral to its former position; c, closure of capsule.

head in a valgus or adducted position in direct weight-bearing line with the shaft and it must maintain that position when the thigh is in not more than 15 degrees of abduction. If the upper end of the shaft slips out of the head when the leg is brought parallel to the long axis of the body, it is possible that there is a lever action between the shaft and the hypertrophied and scarred transverse acetabular ligament. It should be possible to place the head in marked valgus position without unduly stretching the ligamentum teres.

If these conditions can be met, the modified Brackett operation results in more painless, movable, weight-bearing hips than any other reported here, except the high oblique intratrochanteric osteotomy. This is done on cases that have good apposition, with the idea of restoring the weight-bearing line between the shaft and the head, when there is very heavy fibrous or partial bony union. In selected cases this gives good results.

A detailed description of the author's operative procedure accompanied by drawings is presented. This procedure has been used in 6 cases of fresh subcapital fractures with complete restoration to normal in all cases. In ununited fractures, however, because of the absorption of bone of the neck of the femur, the formation of large amounts of fibrous tissue within the capsule, the hardening of the capsule, and the weakness of the muscles from long disuse, this cannot be achieved. There must be some shortening because of the absorption of the neck, and this in itself interferes with the normal range of motion in the hip. The amount of dissection necessary at the time of operation is so extensive that there is probably considerable scar tissue around the hip joint. Many months are required for the reëstablishment of control of the hip joint by the muscles which are responsible for its motion.

Nevertheless, when the shaft of the femur bears weight in direct line with the head and into the acetabulum, a comfortable, weight-bearing hip with a movable head can be obtained. The patient can be restored to useful activity and be comfortable for the remainder of life so far as the hip is concerned, in spite of the fact that extremes of motion may never be established. Restitution to complete normal in the author's opinion is not to be expected in any reconstruction operation for long-existent ununited fractures of the neck of the femur.

Following the operation a heavy compression dressing is applied with a muslin bandage, and bi-

lateral Adams' plaster boots are used with the hips abducted 30 degrees. These boots are bivalved and motion is started in the well leg in three or four days. Flexion of the knee and ankle and active muscle exercises are given daily. The patient is allowed to sit up in bed and is turned prone for one hour twice each day. Motion in the affected leg is started within a week, and, the cast being bivalved horizontally, the knee and ankle are given active exercise. The hip is flexed, but is never brought into more than 20 degrees of adduction and out as far as 45 degrees of abduction. When the patient is turned, after the first two weeks, a pillow is placed under the knee of the injured leg in order to retain full extension of the hip.

Weight-bearing is permitted in eight weeks. There is no protection in the way of a splint. The patient is usually started at walking supported by two individuals in whom he has confidence. This is important. The surgeon and his first assistant can accomplish much more in the first two weeks than can be gained by the use of crutches in a number of weeks. It seems that the time of the surgeon and his first assistant is well spent in the first few days of walking, in the establishment of confidence in the mind of the patient that the hip is solid and weight can be borne without fear. The patient is urged to put full weight on the hip. There may be some tenderness, but it seems to be largely in the muscles and not in the joint. If the head remains firmly on top of the shaft, with direct weight-bearing between the head and the shaft and acetabulum, no pain occurs in the joint and the shaft is constantly forced into the head.

The percentage of bony unions is undeterminable. In patients who have been walking for eight or ten years after this operation, the return to continuous bony structure is so gradual that it has not been possible to determine when it occurs. It is believed that there probably is no bony union at the time weight-bearing is allowed, but experience suggests that if the head is free in the acetabulum and the weight is transmitted in direct line with the head held firmly between the shaft and acetabulum, creeping substitution will be found to occur even in a dead head.

In 1 instance there was microscopic evidence of bony union in a necropsy specimen obtained three months after the operation. The fracture occurred eighteen months prior to the operation. In no case has flattening of the head, such as occurs following dislocation of the hip, been seen. Mention must be made of the distorted appearance of the hip seen occasionally following operation. It seems almost impossible to reproduce in the roentgenograms what is seen at the operating table. The cases which give an impression of great security and good alignment at the operating table show the shadow of bone apparently in a position which could not bear weight, yet the case progresses to a satisfactory result.

In the 41 cases reported, 28 of the results were good; painless functioning hips which bore weight painlessly allowed the patients to resume their former occupations. Among the remainder of the cases there have been 2 deaths. In 6 the results were poor, the shaft having slipped out of the head with lack of weight-bearing stability. In one of these a Whitman operation has been done and in another a high osteotomy, within the last two years. In both of the cases there now is weight-bearing with comfort. One head collapsed and gradually disintegrated except for the weight-bearing fragment, but the function remained good. One case is in doubt. The patient felt that the hip was much improved. She was walking with a cane but it could not be determined that there was good weight-bearing and in the author's opinion the lesser trochanter was bearing against the lower edge of the head which had rotated into a valgus position.

ROBERT P. MONTGOMERY, M.D.

SURGERY OF THE BLOOD AND LYMPH SYSTEMS

BLOOD VESSELS

Hawkes, S. Z., and Hewson, G. F.: A Study of Varicose Veins. *Surgery*, 1940, 7: 714.

Six hundred consecutive, unselected cases of varicose veins were studied and treated under the supervision of the authors. The patients included 441 women and 159 men, an approximate 3:1 ratio. This inequality between men and women suggests the association of the ovarian endocrine system with the development of varicose veins. The ovarian endocrine system might help to explain the high incidence of this condition in women between the ages of forty and forty-nine years, during the period of the menopause.

Childbearing and a positive family history, together with phlebitis and injuries, are the underlying factors in the production of varicosities. Pregnancy is the most common predisposing factor. The laboring class suffers less from varicose veins than the nonlaboring class.

Ligation of the saphenous vein was found necessary in 74 per cent of the cases, and nearly half of the patients required the operation on both legs. When a ligation is not indicated, the treatment consists of injections alone.

Twenty-five per cent of the patients in this series developed ulcers. Ulceration usually occurs only after the tissue vitality has been lowered for many years by the stagnant incompetent circulation with its resulting anoxemia and tissue injury. The treatment of the ulcers consists in eliminating back pressure and in combating infection. In the acutely inflamed ulcer hot hypertonic solutions are used at first, together with rest and elevation. In selected cases Unna paste boots are applied from the toes to the knee. As soon as the acute inflammation has subsided, ligation is done.

An ideal sclerosing solution should give maximum thrombosis with minimum pain, without producing allergic reactions, and without causing tissue necrosis. There is no solution which meets all of these requirements. A solution containing 30 per cent invert sugar and 10 per cent sodium chloride has been used routinely for the large veins. The resulting thrombosis is good and sensitivity never occurs.

Of the several contraindications to treatment, block of the deep venous return is the most important. A past history of phlebitis and an abnormal appearance of the leg may cause one to suspect a block of the femoral vein. Perthes' test will quickly demonstrate a venous block. A dirty ulcer should be cleaned up before injections are started. During active phlebitis, injections are for the most part contraindicated. A patient with active syphilis should be treated for the syphilis before the veins are sclerosed. The authors do not consider controlled diabetes a contraindication to treatment. A patient having cardiovascular disease with decompression should not receive treatment by injection. Patients having varicosities are not treated during pregnancy because the veins frequently disappear after parturition and also because of the added danger of phlebitis.

The results in this series have been very good. The most difficult cases have been those with a previous deep phlebitis and marked edema of the leg with ulceration. The use of the two-point ligation has been very successful in aiding the type of vein pathology in which the communicating veins passing from the deep to the superficial circulation have incompetent valves. In these cases a high ligation is not sufficient to check the reflux, and subsequent injections will be quickly recanalized.

HERBERT F. THURSTON, M.D.

BLOOD; TRANSFUSION

Kreinin, S.: The Effect of Sulfanilamide on the Cross-Matching of Blood. *J. Lab. & Clin. Med.*, 1940, 25: 699.

This study was conducted to determine the effect, if any, of sulfanilamide upon the cross-matching of blood. Upon admission to the hospital the blood of each of the 24 patients studied was typed and cross-matched. A complete blood study (red-blood-cell and white-cell counts, sedimentation time, and blood chloride determination) was also done. Sulfanilamide in doses of from 15 to 20 gr., with sodium bicarbonate was given every four hours for a period ranging from forty-eight to seventy-two hours. Following this, a sulfanilamide concentration test (Marshall's method) was made and the patient was recross-matched. Again the sedimentation time and the blood chloride were determined.

Although the number of cases reported is too few for final conclusions to be drawn, certain facts are apparent. Sulfanilamide *per se* does not disturb the cross-matching of blood. The sulfanilamide concentration test being accepted as an indication of the ability of the patient to absorb sulfanilamide, it was noted that there was a wide variation in the rate of absorption and excretion of the drug. One patient who had received 120 gr. of sulfanilamide exhibited 15 mgm. per 100 c.cm. of blood; another patient under the same dosage had none in the blood. One patient who had received 300 gr. of the drug had a concentration of 3 mgm., while another who had received 100 gr. had a concentration amounting to 18 mgm.

From this study the authors conclude that the inability to cross-match blood following the administration of sulfanilamide is due to changes in the blood brought about by the disease requiring the use of sulfanilamide rather than to the drug itself.

HERBERT F. THURSTON, M.D.

Aylward, F. X., Mainwaring, B. R. S., and Wilkinson, J. F.: The Effects of Some Preservatives on Stored Blood. *Lancet*, 1940, 238: 685.

The authors note that although many investigations have been made on the preservation of blood, comparatively few have included studies of the chemical changes. Blood is a highly complex physiochemical system, and changes may arise through alterations in the organic constituents, by diffusion across the membrane of the red cell, or by liberation of the cell contents after rupture of the cell membrane. In the experiments described and reported herewith the authors have limited their discussion to hemoglobin and potassium and phosphorus compounds, because these constituents are present in widely different concentrations in the cells and plasma of normal blood.

The technique of the experiments is reviewed in detail. The observations of the authors are recorded. The authors conclude that in the plasma of stored blood there is an immediate rise in potassium, an initial fall followed by a gradual rise in inorganic phosphate, and a delayed and gradual rise in hemoglobin. Since there is no direct correlation between these changes, different processes must be involved.

In blood stored with the minimum of dilution, citrate-glucose appears to be definitely better than citrate alone, and both are better than heparin as anticoagulants in delaying hemolysis and in retarding the chemical changes in the cells leading to increased values for plasma inorganic phosphate. None of these anticoagulants prevented the diffusion of potassium into the plasma, but over a long period the citrate-glucose showed a lower value for plasma potassium, probably because of the lower degree of hemolysis. HERBERT F. THURSTON, M.D.

RETICULO-ENDOTHELIAL SYSTEM

Basile, A.: The Reticulohistiocytary Neoplasm Located in the Lymph Nodes (Le neoplasie reticolo-istiocitarie a sede linfoghiandolare). *Ann. ital. de chir.*, 1940, 19: 257.

Basile describes a personal case of reticulohistiocytary tumor of the lymph nodes and 3 cases found in the collection of the laboratory of General Pathology of the University of Messina. In the first case, the initial histological findings suggested the presence of a typical endothelioma, but the subsequent evolution of the tumor showed all the characteristics of a reticuloma; this supports the concept that the tumors deriving from the endothelium of the lymphatic vessels belong to the reticulomas. The second case was a reticular form of reticuloendothelioma with very malignant histological characteristics. The third case was distinguished by slightly atypical cells with very rare caryocineses. The fourth case was one of the frequent syncytial forms found among the various reticulohistiocytary tumors.

It is difficult to estimate the frequency of occurrence of reticuloma, because its clinical diagnosis is impossible and even its histological diagnosis presents difficulties. The tumor seems to be rare and to belong especially to youth and adult age. Its etiology is unknown, but infection in general appears to be an adjuvant factor and undoubtedly causes proliferation of the cells of the reticulohistiocytary system which may favor the origination of the tumor. From the histological point of view, the tumors are divided into reticular forms, in which there is a strong development of the fibrils, some forms having a syncytial aspect and some having a carcinomatoid aspect.

The reticular form is very malignant, progresses rapidly, and soon leads to cachexia; it presents an undifferentiated aspect which recalls embryonic mesenchymal tissue. The cells have little protoplasm, a clear nucleus with nucleoli, and numerous prolongations extending in various directions and anastomosing irregularly to form a network. The cells appear immersed in this network and are decidedly atypical; nuclear monstrosities and asymmetrical and pluripolar mitoses are frequent. They may be elongated and arranged in bundles so as to imitate fusocellular sarcoma. On the other hand, there is a tendency toward differentiation, as shown by the phagocytic property exhibited by some of the cells.

The syncytial form is also malignant, progresses rapidly, and leads to cachexia and death. It is characterized by a fine connective-tissue framework formed by bundles of collagenous fibers which surround neoplastic masses or cords consisting of cells with a single elongated, round, or polygonal nucleus and syncytial zones. Usually these zones constitute the largest part of the tumor and are formed by protoplasmatic masses of varying size without cellular delimitation and with numerous nuclei, for the most part close together. Zones of necrosis are frequent.

The carcinomatoid form consists of cords of cells recalling carcinoma; these masses may be separated by sinusoid formations, at the limits of which the cells are differentiated into endothelium. Some of the cells show distinct phagocytosis. Histologically and clinically, some of these forms are only slightly malignant.

The clinical symptoms of reticuloma are not characteristic. The disease begins with swelling of one or more lymph nodes of the upper part of the body, principally in the lateral cervical region; the swelling increases slowly, reaches a variable size, and spreads to neighboring lymph nodes. The nodes are hard and painless, and adhere to the underlying tissues and later to the skin. Usually, there is no fever. There is always some anemia; slight leucocytosis or lymphopenia, both with neutrophilia, has been reported in some cases, but monocytosis, if present, is more important. The course of the disease is always malignant, but its duration varies. Local recurrence is frequent. When the neoplasm is limited to one or a few lymph nodes superficially located, early excision is the treatment of choice.

Roentgen irradiation is rather efficacious and may relieve the patient for years; it is indicated in diffuse tumor or in inoperable cases, because nearly all forms of reticuloma are roentgen sensitive.

RICHARD KEMEL, M.D.

LYMPH GLANDS AND LYMPHATIC VESSELS

Roos, B.: Cerebral Manifestations of Lymphogranulomatosis Benigna (Schaumann) and Uveoparotid Fever (Heerfordt). *Acta med. Scand.*, 1940, 104: 123.

The author notes that the causes of both benign lymphogranulomatosis and of uveoparotid fever are still obscure, and it has not been proved that these two disease pictures are parts of a larger disease entity. It is certain, however, that the two are closely related clinically, and in many cases there is much that indicates a common cause.

Prior to this report, 9 cases of benign lymphogranulomatosis in which neurological signs had occurred were reported in the literature. Three additional cases with neurological signs are now added to these. One case of benign lymphogranulomatosis occurred with diabetes insipidus; another, in an infant, with convulsions and changes in the cerebrospinal fluid. At autopsy of the latter there were granulomatous formations in the falx and tentorium cerebelli. In the third case there was facial paralysis.

Signs of a disturbance in the nervous system are relatively frequent in uveoparotitis. The most common neurological disorder is facial paralysis. Facial paralysis was found in 12 of a series of 40 cases, and in 3 of these it was bilateral. It was present in 22 of another series of 45 cases of uveoparotitis.

The author in a brief summary makes a comparison between the cerebral signs which appear in cases of benign lymphogranulomatosis and of uveoparotid fever. Striking similarities in cerebral signs appear despite the rather variegated symptom pictures and the small number of cases. In both groups there are signs of meningeal irritation and of pathological processes in various places in the brain. A definite tendency to basal localization is also seen. The fact that the hypophyseal region is so often involved merits special attention. While these similarities between benign lymphogranulomatosis and uveoparotid fever do not permit any conclusions as to the common origin of the two conditions, it is interesting that even the symptoms produced by the cerebral localization of the morbid processes exhibit rather striking likenesses.

HERBERT F. THURSTON, M.D.

SURGICAL TECHNIQUE

OPERATIVE SURGERY AND TECHNIQUE; POSTOPERATIVE TREATMENT

Sheehan, H. L.: Subendocardial Hemorrhages in Shock. *Lancet*, 1940, 238: 831.

Subendocardial hemorrhages, localized to the left side of the interventricular septum and less often also to the musculi papillares and trabeculæ of the left ventricle, are almost invariably present in obstetrical deaths from shock, except when the patient dies rapidly. The fact that they are also found in deaths from various kinds of cerebral lesions suggests a possible nervous mechanism for their production in shock. They are presumably a post-mortem indication that a vascular disturbance in this region has been present for some time before death, but the relationship of this vascular disturbance to the syndrome of shock is not yet elucidated.

SAMUEL KAHN, M.D.

Best, C. H., and Solandt, D. Y.: Concentrated Serum in the Treatment of Traumatic and Histamine Shock in Experimental Animals. *Brit. M. J.*, 1940, 1: 799.

The authors describe experimental work in the treatment of shock. They believe that the basis of traumatic shock is the fall in the volume of circulating blood. This may be due to frank hemorrhage, to fluid exudation from atonic capillaries, or to stagnation in a dilated capillary bed. They believe that the methods of treating shock must aim at halting these processes and correcting their results. They believe that any procedure useful in severe shock should be initiated by the administration of a vasoconstrictor, temporarily to correct vascular atony so that solutions introduced into the blood stream are not lost immediately into the tissues. For this purpose they use both pituitrin and adrenalin.

Shock was first produced in a series of dogs with histamine, and by striking the animal on the thigh with a heavy steel or small rubber hammer. Continuous blood-pressure readings were then taken. It was found that in both dogs shocked with histamine and those shocked by trauma the best results were obtained by the administration of a vasoconstrictor substance followed by a liberal quantity of concentrated blood serum. They found pituitrin the vasoconstrictor of choice, even though tolerance had to be built up to it. In their experiments they found the immediate effect of the osmotically equivalent 20 per cent dextrose, 3 per cent sodium-chloride solution, or three-times-concentrated blood serum to be about the same. The effect of dextrose is much more prolonged than that of salt solution, but in their experiments concentrated blood serum was still superior. Hematocrit determinations were made and demonstrated that in all types of shock there was a definite concentration with respect to the red blood corpuscles. However, they do not record the effect of this treatment upon the blood concentration.

The authors conclude that in shocked animals, whether the condition be initiated by histamine or trauma, a definite benefit is derived from the primary use of pituitrin given intravenously followed by an adequate quantity of concentrated blood serum. Their experiments indicate that in traumatic shock at least, the injection of a hypertonic fluid is more beneficial than injection of an isotonic fluid of the same constituent. They believe that these experiments should encourage a trial of pituitrin and concentrated human blood serum on patients suffering from severe traumatic shock.

WILLIAM C. BECK, M.D.

Gordon-Taylor, G.: A Further Review of the Interinnomino-Abdominal Operation: 11 Personal Cases. *Brit. J. Surg.*, 1940, 27: 643.

Eleven cases are reported, in which the interinnomino-abdominal operation (hindquarter amputation) was done for malignant involvement of the upper end of the femur, the innominate bone, the muscles of Scarpa's triangle, and the psoas muscle. The magnitude of the operation inevitably leads to a mortality of about 1 in 3. Any great diminution in the mortality rate is hardly to be expected, despite an increased familiarity with the operation and the great improvement in pre-operative and postoperative therapy.

The desirability of nerve blocking by spinal anesthesia and local infiltration of individual nerves before their division is emphasized. The institution of some form of drip infusion, before the start of the operation, is also recommended, since in this way the introduction of saline solution or blood can be regulated at will, to meet the requirements of the patient.

SAMUEL KAHN, M.D.

ANTISEPTIC SURGERY; TREATMENT OF WOUNDS AND INFECTIONS

Achutin, M. N.: First Aid in Gunshot Wounds. *Nov. khir. arkh.*, 1940, 45: 195.

Narrow canals created by gunshot injuries should be widely exposed, the incision being carried not only through the skin and subcutaneous tissues but also through the fascia because the hematoma is usually located within the muscles. Retention sutures placed after the introduction of a sponge close the wound hermetically and thus favor development of a septic or anaerobic phlegmon.

Complete excision of the wound can be performed only in a limited number of cases because the removal of tortuous canals in the presence of extensive injuries of the muscles, fascia, blood vessels, and nerves creates large defects with resulting functional

disturbances. Furthermore, the technique of a properly executed débridement requires numerous instruments, and a prolonged observation of the patient is highly desirable. Such conditions cannot be met at first-aid stations under war conditions. Moreover, many injured soldiers do not reach the first-aid units early enough to justify an extensive operation with the hope of avoiding infection. A complete excision is not indicated in injuries with comminuted fractures, abdominal traumas, and gunshot wounds of the soft parts of the trunk and extremities, or injuries of tissues in the close vicinity of blood vessels and important nerves. On the other hand, in tangential injuries of the trunk and extremities a débridement can be easily performed, but this type of injury heals without any surgical interference.

As to facial injuries, the excellent blood supply secures healing even if the wound is not excised.

In brain injuries, the author removes only osseous fragments and parts of the bullet located close to the surface and therefore easily accessible; deeper situated fragments are not removed in order to avoid infection of the adjoining healthy portions of the brain. After the excision of the crushed teguments, débridement of the margins of the bone and removal of accessible foreign bodies from the brain are done. The crushed brain tissue is washed out with physiological saline solution and after careful hemostasis the torn dura mater is trimmed without any attempt to suture the structures. Otherwise an acute infectious process may develop and an accumulation of lymph and an inflammatory edema may produce a hernia of the brain.

The insertion of sponges and application of thick dressings in injuries of the chest which are complicated by an open pneumothorax should be condemned. A tamponade is permissible only in first-aid stations, but further back in the field an excision of the wound and suture of the muscles and pleura, the defect in the skin being left intact, is indicated. A primary suture of the entire wound causes a grave phlegmon of the chest wall, with a resulting cutting of the sutures and spontaneous reopening of the wound. A blood transfusion greatly improves the operative results.

Penetrating injuries of the abdomen require an operation after a preliminary intravenous injection of glucose and saline solution, which should be supplemented by a blood transfusion if a hemorrhage is suspected. The operation should be performed as rapidly as possible. Ether anesthesia produces an undesirable fall of the blood pressure and therefore may be replaced by an intravenous evipal anesthesia. On the average, from 1.5 to 2 c.cm. suffice. The drug has a slight depressor effect. The author prefers a combined ethyl-chloride-ether anesthesia because it rapidly produces sleep, requires a very small amount of ether, and shortens the period of excitation. Whenever possible, he sutures the perforations in the intestines, without resection; in the presence of extensive injuries of the large intestines, an exteriorization of the traumatized segment is recommended because primary resections are not well tolerated by gravely injured soldiers. Irrigation of the peritoneal cavity is not done by the author, but he uses sponges saturated with rivanol; soiled omentum is resected. If the intestines are perforated in only a few places and no feces are found in the peritoneal cavity, the latter is sutured without drainage.

Injury of the kidneys requires operative intervention only in the presence of a progressive anemia or an increase of retroperitoneal hematoma. Urinary suffusions may follow suture of a wound of the bladder and the introduction of a retention catheter, and therefore the author insists upon a suprapubic cystostomy. This operation is also the method of choice in injuries of the proximal portions of the urethra.

In fractures the author recommends an extensive débridement with excision of the injured soft parts and removal of foreign bodies and free osseous fragments. A dressing saturated with a 2 per cent chloramine solution or rivanol is applied and the injured extremity is immobilized.

As a rule injuries of articulations are treated in a conservative manner, by immobilization if the port of entry is small. If an extensive injury of the soft parts without great comminution of the bones is found, a débridement followed by suture of the capsule but not of the skin is suggested. Extensive injuries of the bones require primary resection.

JOSEPH K. NARAT, M.D.

Desjacques, R., and Auger, P.: Some Reflections on the Wounded of the Spanish War (Réflexions sur les blessés de la guerre d'Espagne). *Lyon chir.*, 1939-1940, 36: 645.

The authors treated personally at the Hôtel-Dieu at Lyon 68 wounded soldiers, 56 of whom had come directly from Spain and 12 of whom had been previously treated elsewhere in France and later referred to this hospital.

Even the least seriously wounded were in such an advanced state of malnutrition and fatigue that feeding caused gastro-intestinal upsets, chiefly diarrhea. Almost all had scabies.

Much time had to be spent in removing plasters of all types and constructions, inscribed with the name of the surgeon, the date of injury, and the deformity; in changing dressings which, like the plasters, were very odorous; in providing antitetanic serum and vaccination; and in taking x-rays.

The average ages of the patients ranged from twenty to thirty years with extremes of seventeen and fifty-one years. Four patients died and the causes of death were brain abscess, caseous pneumonia, septicemia from an infected knee, and fungus cerebri with meningitis.

The wounded were classified under the following headings:

(1) Leg amputations, 7 cases. Two were done at the Hôtel-Dieu for osteomyelitis of the tibia and for

suppurative arthritis of both knees, respectively. Five had been done before arrival; 1 of the patients needed a plastic operation on the stump.

(2) Compound fractures, 15 cases, comprising 1 of the maxilla, 5 of the humerus, 3 of the forearm and elbow, 3 of the femur, 2 of the tibia, and 1 of the astragalus.

(3) Suppurative lesions, 12 cases, comprising 6 abscesses and phlegmons of the lower extremity, 2 of the upper extremity, 1 of the lumbar region, 1 pleural fistula, 1 of the neck, and 1 psoitis.

(4) Serious nerve lesions, 4 cases, comprising 1 lesion of the cauda equina with urinary incontinence, 1 lesion of the thoracic cord with paraplegia, 1 paralysis of the brachial plexus caused by scar tissue, and 1 division of the tibial nerve. The latter 2 cases were operated upon successfully.

(5) Foreign bodies, 3 cases (only large foreign bodies were included in this group); 1 case involving the calcaneus, 1 the carotid region, and 1 the psoas muscle.

(6) Fistulas and sinuses, 19 cases, 1 of which was vesicorectal.

(7) Simple leg fractures, 2 cases.

(8) Non-surgical affections including scabies, blennorrhagia, malaria, psychoses, herpes, arthritis, and pulmonary tuberculosis.

The authors deplore the prevalent practice of war surgeons of covering contaminated wounds with dressings and plaster-of-Paris as the only treatment. They emphasize that the fundamental surgical principles for treatment of wounds should not be forgotten and that immobilization in plaster is only an adjuvant. RICHARD WARREN, M.D.

Reimers, C.: The Care of Bomb-Injuries in a Base Hospital. From Experiences in the Chinese War (Ueber die Versorgung von Bombenverletzten in einem Basislazarett. Nach Erfahrungen auf dem chinesischen Kriegsschauplatz). *Chirurg*, 1940, 12: 145.

This is a most interesting and instructive work for the war surgeon. Reimers draws a sharp line between field surgery, i.e., that of the war of movement, and war surgery on native soil, or behind the lines, in base hospitals. In the former, many things are impossible which are practicable in the latter; in the former there are other indications and different methods of treatment than in the latter. During the stationary war of the World War many Hamag-Voss Planwagen (a German make of closed trucks) were converted into good ambulances, and many field hospitals were transformed into well equipped hospitals. In his base hospital, Reimers saw also many old gunshot wounds. The fresh ones were almost entirely bomb injuries sustained from bombing planes. In the war of movement in 1936 he frequently came across emergency bandages coated with black, damp earth and grass pulp, and it was remarkable that although there were numerous cases of gas gangrene, there were none of tetanus. Since 1937 bandage kits have been introduced in China. Much damage has been done with tourniquet bandages which were often the forerunner of gas gangrene. Tourniquet bandages should not be handled by lay persons. In cases of fresh bomb injuries, tourniquets rarely come in question, since serious hemorrhages do not occur as a rule. Many injured were put into emergency or regular Cramer and wooden splints. Isolated cases were treated with extension splints, particularly by American surgeons. The results seen by Reimers were poor, since serious pressure resulted. The ambulance corps must be well trained in the use of such splints. Reimers is right in stressing that in cases of mass injuries the Chief Surgeon must take charge of examinations and determine the order of operations.

Serious cases of shock which did not readily respond to intravenous injections and elimination of pain were temporarily put aside. The most important question is the elimination of pain. Morphine is good but does not eliminate pain entirely. In many cases the local injection of novocaine is of more use; Reimers stresses in particular that shock can be eliminated much more quickly with this method than with any other.

In severe injuries to the extremities he uses spinal or plexal narcosis. No advantage was seen in transectional narcoses. From his own experience Reimers holds the assertion that novocaine-adrenalin injections favor gas gangrene and therefore should be avoided, as unjustified. Experimentally, he has used local anesthesia, but this is not possible in field surgery, where general anesthesia takes first place. Local anesthesia was used in 53.4 per cent of 1,972 cases of war surgery; spinal anesthesia in 20.5 per cent; and neural anesthesia in 8.0 per cent; i.e., 81.9 per cent received local and pain-eliminating anesthesia. Stupor was used in 8 per cent; general ether anesthesia in 5.4 per cent, and for 6.6 per cent there was no record.

Bomb injuries are generally similar to artillery injuries. Torn-off bomb fragments of lead occasionally may cause smooth, sharp wounds. Reimers stresses that the extent of muscular damage and skin defect is the decisive factor for infection. Injuries were represented as follows: face 5.8 per cent; skull 7.6 per cent; spine and back 2 per cent; chest 3.2 per cent; abdomen 2.4 per cent; pelvis 5.9 per cent; upper extremities 34 per cent; lower extremities 34.9 per cent; gunshot wounds in the soft tissues 70 per cent; and bone injury from gunshots 30 per cent. Among the gunshot wounds were 49.7 per cent caused by pistol and infantry rifle, 47.7 per cent by artillery; and 2.6 per cent undetermined.

Gas-edema infection was frequent (percentage not quoted). At times Reimers saw it develop already a few hours after injury (favored by tropical climate?). It requires immediate surgical intervention. In cases in which gas gangrene has already set in, and serious damage from injuries requiring amputation is present, the author recommends an immediate tourniquet bandage at the point of the intended amputation. He has never seen gas gangrene spread

beyond the point of the tie-off. Furthermore Reimers expresses his opinion most convincingly about Friedrich's wound resection. The six-hour limit is not always correct. For example, he cites a case in which he had to perform an amputation of the upper leg on account of a smashed lower extremity in an otherwise healthy individual; although the amputation took place within about one hour after injury, gas gangrene resulted just the same, but recovery followed after further incisions had been made.

Total excision should not be extended to severe gunshot injuries, since it always remains an incomplete procedure and "the end result is always an infected wound." If a smashed region is to be radically resected, it should be amputated. It need not be emphasized that primary suture should not be considered after a check-up of the injuries. The author is rather reserved regarding bone splinters and lodged shell fragments. X-ray pictures may be misleading: even in cases of osteomyelitis he has refrained from premature intervention. The author finds it striking that in cases of gunshot injury to the joint, frequent reference is made to primary suture of the joint capsule. He has rarely used this method because the capsula articularis is usually too severely damaged. In such cases, however, he was able to prevent secondary infection of the joint by primary skin-graft transplantation. "If a skin graft covering was not successful, kinesitherapy according to Willems was attempted in cases of knee, ankle and elbow joints." The author will report more about this method at a later date.

Skin grafting was also used in fractures, but only in the absence of serious muscular injuries (for instance in centrifugal gunshot of the tibia). Finally, the author mentions injuries caused by collapsing structures and burns from electricity. The latter occur frequently during bombing raids when insulations are destroyed after the collapse of houses. The burns were often of the third and fourth degree; they were treated with tannin and all recovered. Superficial shot wounds played a subordinate rôle. However, at times even small shell fragments showed a tremendous penetrative power.

(Franz). Hilda H. Wullen.

Decker, P., and Rossier, J.: Craniocerebral Wounds in War Surgery (Les plaies cranio-cérébrales en chirurgie de guerre). *Rev. méd. de la Suisse Rom.*, 1940, p. 321.

Decker and Rossier note that the craniocerebral wounds of war differ from those of civil life in that they are more frequently open wounds subject to danger of intracerebral infection. In addition, there are usually diffuse cerebral lesions due to the shock of the projectile against the skull, if not cerebral lacerations caused by the penetration of the projectile. The severity and extent of the lesion of both the skull and the brain depend upon the nature of the projectile and the direction in which it enters the skull. In cases in which the dura is not broken, the condition is less serious than in those cases in which the dura is penetrated. The infection may be primary, from micro-organisms carried into the brain by the projectile or fragments of the fractured skull; or it may be the secondary infection of an open wound. Cerebral infections, even when primary, are slow to develop, and clinical signs of such infection are not immediately evident.

The diagnosis of cerebral injury in war wounds is not necessarily evident. In cases in which the lacerated cerebral substance is visible at the base of the wound, or in which two cutaneous openings indicate the course of the projectile through the skull and brain, the diagnosis is evident. However, in cases in which there is a single exterior wound, it is often difficult to determine whether the brain or even the skull has been injured. Roentgenological examination may show the presence of a skull fracture with penetrations of fragments into the brain or it may show the projectile, but a negative roentgenogram does not necessarily indicate that there is no penetrating wound. All scalp wounds should be carefully explored.

If the cerebral lesions in war wounds are of the same type as those in civil life, i.e., commotion, contusion, compression by extradural or subdural hematoma, and diffuse circulatory phenomena, the treatment is the same. In the more typical craniocerebral war wounds with exposure of the brain and rupture of its covering by penetrating projectiles, treatment to avoid the development of primary or secondary infection is definitely indicated. The method used and advocated by all surgeons in the last World War and used by the authors is the excision of the wounded tissue in all layers, and primary suture of the wound in two planes (sometimes completed by a cranioplasty). This treatment need not necessarily be employed until after the first twenty-four hours in order to permit some recovery from the primary effects of the cerebral trauma. In such cases the wound is not disinfected—even the hair is not shaved; the wound is merely covered with a sterile dressing. This is important for the wounded in war who are not submitted to immediate operation. After operation, the patient should be under the surgeon's observation for from fifteen to twenty-one days; the dressings should be changed by the surgeon in the operating room. In regard to the removal of projectiles from cerebral wounds, the authors agree with the rules laid down by Rouvillois and others: projectiles situated at the base of the brain near important nerve centers, those of very small size, and those situated at a distance from the point of entry should be left *in situ;* in the latter case it may be possible to remove the projectile by a route of operation not related to the point of entry.

In dealing with the wounded with craniocerebral lesions, immediate operation is indicated in those with cranial hemorrhage and those who show signs of cerebral compression. An operation, even if not of the best type, is their only chance. If sent to the rear without operation, they die in transport. Soldiers with multiple wounds and much bleeding (in-

cluding a cerebral wound) in a state of shock should be treated at the field hospital or dressing station for shock and anemia; they should be sent to the rear within seventy-two hours, where operation can be done for the cerebral wound. The same plan should be carried out for soldiers with a cranial wound in a state of shock or cerebral "commotion"; an immediate cerebral operation is not necessary in these cases. The patients should be rendered "transportable" before being sent to the rear. Other patients with head wounds should be sent to the rear at once, to a hospital where the necessary operation can be done. Those with head wounds who are to be transported to the rear should have the head immobilized by a light metal apparatus and should be kept in a sitting position. ALICE M. MEYERS.

Schiassi B.: How Far Have We Gone in the Treatment of Infected Wounds? (War Fractures) (A che punto siamo nella cura delle ferite infette? [comprese le fratture di guerra]). *Policlin.*, Rome, 1940, 47: sez. prat. 755, 809.

The author states that he has not been satisfied with the former theories of flooding the infected wound with antiseptics from outside to within the wound. He recalls Leriche's pronouncement in 1939 that we should treat the wound from within to the outside. The author calls attention to the same principles which he himself enunciated at the Surgical Society of Bologna in 1917 deprecating antisepsis from without and treating the wound from within. In his work the author has been inspired by a statement made by Pasteur in his last days: "C. Bernard is correct—bacteria are important, but the terrain is everything."

Contaminated wounds treated within the first six to eight hours are cleansed thoroughly and irrigated with chloramine solution; any pockets are incised, under anesthesia if necessary, and exposed to treatment. Any suturing is done after several days. In the presence of a full-fledged infection the author doubts the efficacy of Dakin's solution, except as a cleansing agent by irrigation. He is not satisfied with the chemical treatment of infected wounds and suggests the correctness of the old hippocratic doctrine that the best treatment is the most natural treatment. The author suggests that the blood itself may be used as an internal medium of treatment as it promotes internal respiration of the tissues; he deprecates Bier's passive hyperemia in that it depresses and interferes with this function of the tissues.

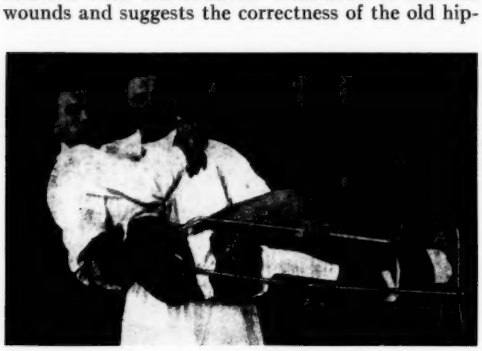

Fig. 1.

The author notes that we have various means at our disposal for promoting hyperemia in tissues and thus obtaining physiological changes through the action of the serum and the blood elements. He emphasizes chiefly local and general baths to obtain these ends. These baths affect the chemical, physical, biological, vascular, and nervous reactions of the tissues—in other words, they alter the terrain. Furthermore, with the general baths the entire skin surface is stimulated and the entire body responds. The author describes and illustrates local baths for the extremities which are immersed in hypertonic solutions containing sodium, potassium, and calcium chloride. These treatments last from three to five hours at 37, 37.5, and 37.8 degrees C.

The author ascribes great importance to the general baths as they affect the nervous, vascular, muscular, absorptive, and secretory powers of the skin. They may be used to stimulate the humoral and defensive processes of the entire body. The author presents illustrations of the general bath with suitable pulleys arranged above which draw up the patient and entire stretcher frame for total immersion of the body. This exerts an anesthetic effect on the pain caused by the inflammation. There is a resultant exosmosis of the inflammatory products from the depths of the tissues to the surface.

The author then discusses the treatment of fractures. For transportation he offers his own modification of the Thomas splint, first reported in 1916. Compound fracture is treated early by washing out the wound with a detergent and by immediate reduction of the fracture. There is no attempt at drainage or suture. The limb must then be immobilized, with traction. The author points out that immobility, elevation, and suppression of pain are the three conditions necessary to promote cure and to control the infection. The elimination of the products of inflammation must be encouraged. The author does not favor the Orr-Trueta closed treatment because it eliminates the latter possibility. He uses neither gauze nor drainage tubes in his open infected cases. He concludes by emphasizing the great hippocratic aphorism, "Sequere naturam"—"follow nature." JACOB E. KLEIN, M.D.

Gold, H.: Active Immunization Against Tetanus by the Combined Subcutaneous and Intranasal Routes. A Simple Procedure for the Maintenance of a Protective Antitoxin Titer. *Am. J. Surg.*, 1940, 48: 359.

While undoubtedly efficacious, immunization by means of tetanus toxoid administered parenterally has the drawback of requiring repeated injections at the time of injury. Intranasal immunization

against tetanus is feasible and practical if it is looked upon as a means of creating a state of antitoxic immunity in advance of an injury. In order to produce and maintain this state of immunity, it is necessary first to render the subject capable of responding to tetanus-toxoid topagen stimulation intranasally by means of the previous injection of two 1 c.cm. doses of alum-precipitated tetanus toxoid given ninety days apart, and then to repeat the course of nasal instillations every six months.

The author used tetanus-toxoid topagen intranasally in 145 human beings. From this work, he concludes the following:

When tetanus-toxoid topagen is instilled in the nose it is absorbed rapidly and in sufficient quantity to bring about a rise in antitoxin titer in subjects who had previously undergone active immunization against tetanus by means of 1, or preferably 2, injections of alum-precipitated tetanus toxoid.

When 0.10 c.cm. of tetanus-toxoid topagen is dropped into each nostril on two or three successive days, or at weekly intervals, it will raise the antitoxin titer of actively immunized individuals from less than 0.10 unit to or above the 0.10 unit level in from seven to nine days. The titer will remain above the protective level for at least several months.

No systemic, but only a transient local nasal reaction occurs after the instillation of tetanus-toxoid topagen.

Active immunity can be maintained in advance of an injury by the repeated use of tetanus-toxoid topagen intranasally. A course of 3 daily instillations should be repeated every six months.

The method of administration of tetanus topagen is simple. The patient is placed on a table with his head in hyperextension. An ordinary glass dropper is then inserted on one side of the nose, with the blunt end pointing toward the turbinates. About 0.10 c.cm. (2 or 3 drops) of the tetanus-toxoid topagen is then squeezed out by pressure on the rubber bulb. The patient is asked to "snuff up" the drops, and the dropper is then removed and wiped with an alcohol sponge. This process of instillation is repeated in the other naris. The subject is kept in the recumbent position for two or three minutes and is told not to blow his nose for a few hours. As expected, this request was not complied with in every case. The intranasal instillations were repeated daily or weekly, two or three times.

No attempts were made to select any of the patients. Several received the tetanus-toxoid topagen while suffering from acute coryza, when their noses were stuffy and filled with mucus. No irrigating solutions or vasoconstrictor drugs were used prior to the instillation. Many patients had deviated nasal septa which made the introduction of the dropper difficult, and in 4 individuals the obstruction was so marked that the drug had to be dropped in at the external opening of the nose.

About one-third of the treated subjects complained of burning in the nose immediately after instillation of the drops. This lasted two or three minutes. In some, there was lacrimation. Two non-allergic patients sneezed frequently for a few hours following treatment. In subjects suffering from hay fever or allergic coryza there was a definite increase in the severity of this local reaction which assumed the form of a "head cold" and cleared up overnight. There was no disability. A few subjects complained of an unpleasant taste when the tetanus-toxoid topagen reached the throat, but this sensation disappeared rather quickly. The local reaction which was undoubtedly due partly to the high glycerin content of the preparation did not interfere with completion of the course of instillations. No systemic reaction such as fever, malaise, urticaria, or asthma was encountered. All patients preferred the nasal rather than the injection method of treatment.

SAMUEL H. KLEIN, M.D.

Ciancarelli, S.: Sixty-Five Cases of Tetanus (Rilievi clinici e terapeutici su 65 casi di tetano). *Policlin.*, Rome, 1940, 47: sez. chir. 99.

The 65 cases of tetanus here reported were treated in the R. Clinica delle Malattie Infettive during the last four years. The highest incidence of the infection was found to occur in summer, 48 cases occurring in males who showed a substantially higher mortality than the 17 females. This was in contrast to the other series. Age appeared to have little influence, and the victims ranged from ten days to eighty-three years of age. As might be expected, farmers and manual laborers were most frequently attacked. The portal of entrance and the type of wound were also noted, and in the majority of cases were found to be lacerations, although the highest percentage of mortality occurred in puncture wounds. Four postoperative, 1 neonatal, and 1 vaccination case were also reported. The incubation period was observed to vary widely from two to twenty-seven days, with an average interval of eight days. The period elapsing between the onset of the symptoms and the beginning of treatment also varied, 36 of 50 cases receiving serum on or before the fourth day. In contrast to figures quoted by other investigators, which ran as high as from 70 to 90 per cent, the mortality in this series was found to be only 32 per cent.

The authors consider the aim of therapy to be threefold: (1) to arrest the elaboration of the fatal exotoxin at the point of inoculation; (2) to neutralize the circulating poison; (3) to liberate the nerve elements already involved from combination with the toxin. With these purposes in mind, serum has been given locally by infiltration and topical application, intracerebrally, intraspinally, intramuscularly, subcutaneously, as well as into the carotid artery. Ciancarelli employed the intramuscular and the intraspinal routes. In an attempt to destroy the combination of the toxin with the nervous elements, serum has been given in combination with chloroform, urotropin, glucose, and ether, respectively. The value of these combinations has not yet been determined.

In the series here reported, the serum was given alone, in heavy doses; 100,000 units were given immediately into the spinal canal, followed by 100,000 or even 200,000 units given intramuscularly, the dose being repeated daily until remission of the symptoms occurred. Relief was usually observed in a day or two. In several of the patients a slight serum sickness occurred, but in no single case did a serious accident take place. On the basis of this experience, the authors are led to believe that the prompt and liberal use of specific serum is the best form of treatment for tetanus.

EDITH FARNSWORTH, M.D.

ANESTHESIA

Guthrie, D., and Woodhouse, K. W.: Safety Factors in Ethylene Anesthesia. *J. Am. M. Ass.*, 1940, 114: 1846.

In August, 1924, the senior author instituted the use of ethylene as an anesthetic agent in the Robert Packer Hospital, Sayre, Pennsylvania. At first it was used cautiously and only occasionally, but gradually, because it proved its adaptability to most surgical cases, it has become the anesthetic of choice for the majority of operations. During the fifteen-year period beginning August 1, 1924, ethylene has been given as the main anesthetic or for induction, supplemented by ether anesthesia, in 35,500 patients.

Based on this experience in which ethylene gas was used in whole or in part as the anesthetic agent, it is the authors' belief that ethylene is an excellent anesthetic for general surgical use.

The induction of ethylene is rapid, smooth, and more pleasant than that of the most common inhalation anesthetics. The respirations are quiet and regular, the skin is dry, and the color is good while the patient is under the anesthetic. Muscular relaxation is excellent and adequate for all general or orthopedic surgical needs. The effect of the anesthetic on the blood pressure is slight. Postoperative nausea, vomiting, and distention are minimal.

For general usage, the authors believe that ethylene is an anesthetic agent which is superior to ether, nitrous oxide, or spinal anesthetics, and, from the standpoint of explosibility, safer than cyclopropane.

The disadvantages of ethylene are few. The main objection to its use has been its explosibility. This objection has been emphasized out of proportion to its merit. There have been no explosions in the authors' experience with this anesthetic.

The avoidance of explosions requires strict adherence to a few rules. No flame must be allowed in the operating room. Static sparks must be avoided by the use of a modern gas machine and the maintenance of a humidity of 56 per cent or higher. The use of an intercoupling unit is advocated.

Pulmonary complications and postoperative phlebitis or severe shock have been infrequent among the patients who have been operated upon under ethylene anesthesia in this series. The incidence of these complications has been lower than that reported for other anesthetic agents.

Five immediate deaths occurred in this series, 2 of which may have been due to ethylene. This represents an immediate mortality of 1 in 17,750 administrations.

The authors express the opinion that ethylene is an excellent anesthetic agent for general surgical use and that an unjust prejudice exists in the minds of the surgical profession with respect to its widely heralded disadvantages. SAMUEL H. KLEIN, M.D.

PHYSICOCHEMICAL METHODS IN SURGERY

ROENTGENOLOGY

Fossati, F.: Hernias, Diverticula, and Sacculated Exudates of the Pericardium: Symptomatology and Differential Radiological Diagnosis (Ernie, diverticoli ed essudati saccati del pericardio: sintomatologie e diagnosi differenziale radiologica). *Radiol. med.*, 1940, 27: 343.

Hernias and diverticula of the pericardium deserve to be studied more extensively from the standpoint of radiology, since the clinical manifestations cannot be properly interpreted without x-ray studies, and the latter must differentiate between other conditions of the heart and mediastinum. These conditions remained unknown for a long time, and it remained for two roentgenologists, Kienboeck and Weiss, to describe them accurately in 1929. At present we are in the phase of systematizing our knowledge of the subject and differentiating it from the complex group of pericardiomediastinal conditions. In 1935 Rizzi reported on the pathological anatomy. Diverticula of the pericardium are circumscribed extroflexions, sac-like in shape, of the pericardium, generally containing fluid, and communicating through a meatus with the general pericardial cavity. There are two types; those consisting of the entire wall of the pericardium (genuine diverticulum) and those involving only the serosa (hernia of the serosa). Diverticula proper are congenital in origin. Inflammatory changes found here are usually secondary. The hernias of the serosa are almost always acquired through pleuropericardial adhesions.

Fig. 1. Right pericardial diverticulum.

Fig. 2. Left pericardial diverticulum.

In 70 per cent of the cases pericardial diverticula and herniations occur on the right side of the heart. The form is round or ovoid. The volume is variable from the size of a nut to the size of a large orange. Only diverticula of a certain volume can produce clinical and radiological findings; the others are merely anatomical curiosities. The contained liquid is usually clear in the congenital cases and cloudy in the inflammatory cases. This liquid causes the density of the x-ray shadow in pericardial diverticula and hernias. Histological study in inflammatory types shows tuberculosis, syphilis, rheumatic infection, and pneumonia. In chronic inflammation parietal calcification is observed. In exceptional cases fistulas may open on the anterior thorax.

Subjectively the patients complain of precordial oppression, palpitation, pain radiating to the shoulder, asthenia, dyspnea, dry cough, anorexia, headache, and mild fever. Objective findings are scarce; there is dullness over the region of the diverticulum. The heart sounds and the electrocardiogram are normal. The clinical course is protracted and the prognosis as to life is good. Death usually results from intercurrent maladies.

Radiologically the visibility depends on the volume. The form is usually semi-oval or semi-circular. As to location 73 per cent occur on the right margin,

14 per cent on the anterior wall, 11 per cent on the left margin, and 2 per cent on the posterior wall. The author presents various illustrations of diverticula in various situations associated with respiration (inspiration and expiration) as well as kymographic tracings of the pulsating diverticulum. The neighboring lung tissue is usually not affected unless there is an inflammatory reaction in the diverticulum. The heart, aorta, esophagus, and trachea are usually not affected. The differential diagnosis must exclude parietal aneurysm of the heart, tumors of the heart, persistence of the duct of Botalli, and echinococcus cyst of the myocardium. Also to be excluded are tumors of the pericardium (lymphangioma, hemangioma, lipoma, sarcoma). Intrapericardial aneurysm of the ascending branch of the aorta must be considered, also affections of the mediastinum, such as lymphogranuloma and lymphosarcoma, benign tumors of the mediastinum, dermoid cysts, and sacculated pleurisy. The author presents numerous illustrations and a helpful bibliography on the subject.

JACOB E. KLEIN, M.D.

Brull, L., Van Pee, P., et Dumont, P.: Immediate and Late Results of Irradiation Therapy in 100 Cases of Toxic Goiter (Résultats proches et éloignés de la radiothérapie de cent cas de goitres toxiques). *Rev. belge d. sc. méd.*, 1940, 12: 33.

The authors present their experience during a period of ten years with irradiation therapy of toxic goiter. In their choice of cases for this type of therapy they exclude nodular goiters which are too large or too hard and those goiters producing scoliosis or tracheal compression.

They emphasize the importance of the preparation of the patient. Irradiation should not be employed until after the patient has received adequate medical treatment. This preparation consists of placing the patient at rest, permitting practically no visitors, an adequate diet with exclusion of coffee, tobacco, and alcohol, and the use of Lugol's solution and barbiturates. This preparation may require one week or several weeks, but irradiation is not begun until the patient's general condition has improved, weight loss has stopped, pulse rate has decreased, and gastro-intestinal irritability has diminished.

The radiation is produced by a difference in potential of 200 kv. filtered by 1 mm. of copper and 1 mm. of aluminum at a distance of 40 cm. and an intensity of 4 ma. The dosage in the majority of cases, applied biweekly, is from 250 to 300 international roentgen units. However, in some cases, it may be preferable to use smaller doses of 75 to 200. Usually three series of treatments of four weeks are given with intervals of six weeks of rest.

As regards the results of this form of treatment, the authors present their experience in two series of cases. The first series comprising 46 cases showed before treatment a median weight of 53 kgm., a median pulse rate of 101, and a median basal metabolic rate of +37. These respective figures following treatment were 60, 88, and +7. Of the 46 patients, 33 returned to normal life, 3 died, 8 presented failures or incomplete recoveries, and 2 could not be traced. In the second series of 54 cases, before irradiation therapy, the median weight, pulse rate, and metabolic rate were 51, 112, and +29, respectively. Following treatment these corresponding figures were 56, 99, and +13. Of these 54 patients, 41 returned to normal life, 7 were benefited, and 6 were not benefited.

The late results in the first series are based upon 31 of the 46 patients examined from five to nine years after treatment. It was found that before treatment the median weight and pulse rate were 52 and 117, respectively, whereas these corresponding figures were 63 and 86 after treatment. Only 3 patients continued to have cardiac disturbances. The 28 others revealed no evidence of hyperthyroidism although 7 had evidence of hypothyroidism.

The authors admit that irradiation may precipitate a thyroid crisis and lead to death. They report 3 fatal cases as examples. In this connection they emphasize again the necessity of adequate preparation before treatment is begun. At the end of the article, they present in tabulated form their 100 cases treated by irradiation.

MICHAEL DEBAKEY, M.D.

MISCELLANEOUS

CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

Leveuf, J.: Traumatic Shock (Le choc traumatique). *J. de chir.*, 1940, 55: 403.

Leveuf points out that the reality of traumatic shock is clearly recognized, especially in the wounded in war, but that its true cause and the mechanism of its production are not yet understood. The essential factor in traumatic shock is the circulatory collapse, involving the peripheral circulation especially. From his analysis of the chief characteristics of traumatic shock, the author comes to the conclusion that it represents a disturbance of the vagosympathetic equilibrium, resulting from a reflex irritation originating at the traumatized site and transmitted by the nervous system. If the resulting damage to the vegetative nervous centers is irreversible, the shock is necessarily fatal. Such fatal shock is most apt to occur in persons who are definitely vagotonic and thus especially predisposed to circulatory collapse.

On the basis of this theory, Leveuf makes certain suggestions in regard to the treatment of traumatic shock. Since it is evident that traumatic shock does not develop at once following the trauma but becomes increasingly severe until the nerve centers may be permanently injured, it is important that the wounded be treated as promptly as possible. Injured persons should be kept warm; and the anoxemia should be treated by inhalation of oxygen in an oxygen tent. Treatment for the circulatory collapse is especially important. Since the vasomotor disturbance involves the peripheral capillaries primarily and the heart only secondarily, measures designed to strengthen the heart are not primarily indicated. This refers not only to the use of cardiac tonics, but also to the intravenous injection of large amounts of serum or large blood transfusions with a view to raising the blood pressure rapidly. The experience of the last war showed that such large injections or transfusions are ineffective and sometimes harmful. Injections of small amounts of hypertonic solutions, such as hypertonic saline or glucose solution, are better, as their osmotic property tends to withdraw fluids from the tissues into the capillaries. Small amounts of blood should also be used for transfusion. Drugs should be used to reduce the vagotonia and stimulate the sympathetic system. To reduce the vagotonia, small doses of atropine are indicated; to stimulate the sympathetic system, adrenaline and less toxic homologues, such as ephedrine, are used. Adrenaline must be employed with care, as its action is of short duration. The use of adrenaline may appear contraindicated because it is a vasoconstrictor, but if the theory of the vasomotor disturbance in traumatic shock is correct, its stimulating action on the sympathetic is of greater importance. In addition, drugs should be used which improve the peripheral circulation, without direct action on the nervous system; for instance, the antispasmodics such as papaverine. Also drugs that act on the vasomotor centers are indicated; of these camphor is best known and is much used by surgeons. The action of camphor in oil is slow, however; for a more rapid effect coramine or cardiazol should be used. As acidosis is a constant factor in shock, bicarbonate of soda should be given in doses of from 8 to 10 gm. daily, by mouth. All these measures should be employed before the necessary surgical procedures are undertaken.

The experience of the last war proved the value of the wide excision of injured muscular tissue in arresting the progress of shock. The question of anesthesia in cases of traumatic shock is one of importance and should receive further study. All the methods of treatment suggested should be employed with care and under close observation, with special attention to changes in the blood pressure.

ALICE M. MEYERS.

Kendrick, D. B., Jr., Essex, H. E., and Helmholz, H. F., Jr.: An Investigation of Traumatic Shock Bearing on the Toxemia Theory. *Surgery*, 1940, 7: 753.

By means of heart and lung preparations, the hind limbs of dogs have been perfused, and the effect, on recipients, of blood from perfused unaffected and traumatized limbs has been observed. While 100 c.cm. of blood from the perfused limbs was being given to the recipient, an equal quantity was withdrawn, defibrinated, and added to the blood reservoir of the heart-lung-limb preparation. As many as 23 exchanges of blood were made during the course of the experiments, which ran from two hours and twenty minutes to four hours and twenty-five minutes.

Blood from unaffected limbs, or from limbs traumatized for short periods, did not produce shock in the recipients as determined by the blood pressure and the concentration of hemoglobin during the period of observation. However, one animal died in eight hours and another in eighteen hours after the experiments were completed. Blood from limbs traumatized for from thirty-five to forty minutes caused a significant decrease in the blood pressure within forty minutes after the first exchange of blood, and death occurred a few hours thereafter. Repeated removal, defibrination, and reinjection of a dog's own blood was without effect on the blood pressure and the animal treated in this manner fully recovered.

The bearing of anesthesia and certain other factors on the results has been discussed. It is concluded that the results of the experiments described in this report furnish suggestive, but not conclusive, evidence for the toxemia theory of shock.

Macpherson, A. I. S., McCallum, E., and Haultain, W. F. T.: The Effect of Intrapartum and Neonatal Administration of Synthetic Vitamin K Analogues on the Newborn. *Brit. M. J.*, 1940, 1: 839.

The discovery of Vitamin K and of its relation to plasma prothrombin, and the recognition of prothrombin deficiency as an important cause of hemorrhage in man suggested a new approach to the problem of the hemorrhagic tendency in the newborn. In normal infants the prothrombin index at birth is usually about 60 per cent and may fall in the first three days of life to dangerously low levels. Thereafter it rises spontaneously to from 70 to 80 per cent and is maintained at that level for some months. Estimations made of babies born after abnormal labor or of mothers suffering from severe toxemia suggest that the type of delivery and the antenatal condition are factors which influence the prothrombin level in the newborn. When synthetic Vitamin K is given to the baby after birth the prothrombin index rises to and remains within normal limits. A similar result has been obtained by the use of natural Vitamin K. The reserve of prothrombin or of Vitamin K is not adequate to maintain the prothrombin level in the newborn until the time when Vitamin K is absorbed in sufficient quantities from the alimentary canal. In the adult intestine Vitamin K is absorbed directly from the food in the presence of bile and from the colon, where Vitamin K may be synthesized by bacterial action.

Milk is a poor source of Vitamin K and in the newborn the contents of the intestine are sterile. Hence it has been assumed that enough Vitamin K cannot be absorbed until bacterial invasion of the bowel occurs. Breast-feeding or the use of unsterilized breast milk on the first day should assist this synthesis by supplying numerous harmless bacteria, but it does not afford any protection against the fall in plasma prothrombin. Other facts also may be involved. It is not known, for instance, whether the composition of bile in the newborn is suitable for the optimal absorption of Vitamin K. Jaundice and prothrombin deficiency do not necessarily coexist. That icterus simplex neonatorum is due to excessive hemolysis and to functional immaturity of the liver suggests that deficient synthesis may also be a factor in neonatal hypoprothrombinemia.

Prevention of prothrombin deficiency will decrease the incidence and severity of complications in the newborn. In most normal babies early breast-feeding will prevent abnormal or prolonged lowering of the plasma prothrombin. The adequate administration of Vitamin K analogue to the mother less than twenty-four hours before delivery leads to its rapid absorption into the fetal circulation and appears to supply a store of Vitamin K sufficient not only to raise to normal limits the prothrombin content of the baby's blood at birth but also to maintain it within normal limits during the early days of life.

A similar effect after birth with a similar absence of any untoward reactions is obtained when the Vitamin K analogue is given in the first few hours of life. Injection of the naphthoquinone gives a speed of action comparable to that of blood transfusion and its effect seems to be more lasting. All these facts suggest that the administration of a Vitamin K analogue either to the mother between twelve and four hours before delivery, or to the newborn, would appear to be especially indicated (1) in cases of maternal toxemia; (2) in premature labor; (3) in cases of difficult or instrumental delivery; (4) when breast-feeding is not possible; (5) when any cerebral symptoms develop during the first days of life; (6) in cases of hemorrhagic diathesis, icterus gravis neonatorum and anemia; and (7) when an operation is necessary on the newborn.

MANUEL E. LICHTENSTEIN, M.D.

Fridericia, L. S., Gudjonsson, S., Vimtrup, Bj., Clemmesen, S., and Clemmesen, J.: Stomach Lesions in Rats Kept on Diets Deficient in Vitamin A. *Am. J. Cancer*, 1940, 39: 61.

In four series of experiments, 114 rats were subjected, intermittently or continuously, to a diet deficient in Vitamin A. Seventy-four rats on a normal diet served as controls. Eighty per cent of the experimental animals showed proliferative changes in the mucosal lining of the stomach, while 13 per cent of the controls had similar lesions. The relationship to malignancy is discussed.

PAUL STARR, M.D.

Petri, S., Nørgaard, F., and Bandier, E.: Studies on the Causation of Experimental Gastroprival Pellagra. *Acta med. Scand.*, 1940, 103: 584.

Eight pigs (Danish swine) were gastrectomized at the age of seven weeks. The effects of this operation were arrest of growth, emaciation, changes in the skin, hypoferric anemia, and central nervous-system degeneration. Nicotinic acid in large amounts did not prevent these changes. The work is well illustrated.

PAUL STARR, M.D.

Ward, G. E., and Covington, E. E.: Hemangiomas of the Skin. *J. Am. M. Ass.*, 1940, 114: 2069.

The authors report in this article their observations and results of present-day methods of therapy in the treatment of 94 consecutive cases of superficial hemangiomas representing 127 lesions.

Every new patient with hemangioma of the skin who comes to the Oncology Clinic of the School of Medicine of the University of Maryland is seen by a radiologist and a surgeon for an unbiased opinion on the proper therapy. In discussing the results the authors consider any and all forms of therapy, whether used alone or combined. Radium therapy is becoming more and more popular throughout the world, particularly in tumor clinics, and this was by far the most common form of treatment.

The results are classified as (1) good, (2) satisfactory, and (3) poor.

1. By a good result from radiation therapy is meant the entire disappearance of the tumor with

no disfiguring patches of hemangioma, scarring, telangiectasis, atrophy, loss of hair, increased pigmentation, epiphyseal injury, or other residuals. It is to be remembered that some slight scarring remains after any form of therapy, but the authors' definition of a good result is one in which the amount of scarring is no more noticeable than the fine linear scar following surgical excision. In this series of 94 cases, all of which were superficial, 40 per cent of the results were considered good. The best results were obtained in infants less than two years of age. After the period of infancy, the good results of irradiation decreased in direct proportion to age.

2. The results were satisfactory in 47 per cent of the cases. In this group also the end-results are compared with what might have been accomplished by surgical excision. The reason for this comparison is that surgical excision is the older form of treatment for hemangiomas. Included in this satisfactory group are all cases in which there is a slight or moderate amount of scarring or telangiectasis, or in which small patches of tumor remain, also cases in which the tumor is entirely gone but the cosmetic result is only satisfactory. In this group too are placed many of the larger hemangiomas, especially of the face where surgical treatment was out of the question because of the size of the growth or extensive involvement of eyelids, lips, or nose. There has been tremendous improvement in many of these cases, but obviously not a "good" result. In many of these cases the pronounced scarring will improve with age, and ultimately give a more satisfactory result.

3. In the group yielding poor results (13 per cent in this series) are included: (1) all port-wine stains (5.3 per cent), which are all radioresistant; (2) most hemangiomas in adults which were radioresistant and which were finally treated with electrosurgery or surgical excision, and (3) all cases in which the residuals, such as patches of tumor, telangiectasis, atrophy, or loss of hair, were so pronounced that the cosmetic result was considered bad.

There are many who think that primary excision of hemangiomas without previous irradiation is the treatment of choice. They argue that time and expense will be saved by primary excision and that a cosmetic result equal to or better than that obtained by irradiation will follow. The authors contend that irradiation gives good or satisfactory results in a high percentage of cases (87 per cent in this series) and therefore that surgical treatment is unnecessary for the majority of hemangiomas. In many cases of failure of irradiation, surgical excision gives the same linear scar that primary excision would have given. The cavernous growths that have to be excised surgically are much less vascular and operation is safer if pre-operative irradiation has been given.

It is the authors' opinion that as a general rule radium gives good results in a large percentage of cases of superficial hemangioma. A fairly extensive review of the literature on hemangiomas reveals that most articles deal with case reports of unusual types, successful cures by various methods of therapy advocated by many authors, and general discussions on the pathology of hemangiomas, but there was not much emphasis on the failures, complications, and late residual effects of irradiation. The patients with bad results are commonly seen by plastic surgeons and do not return to the irradiation therapist unless carefully followed.

Radium is of greatest value in capillary and cavernous hemangiomas in young infants. Cavernous hemangiomas are treated best by external radium and, after several months, by interstitial electrocoagulation for the residual growth. External radium is by far the best and gives the most equally diffuse sclerosing effect of any of the sclerosing agents. Irradiation has given poor results in port-wine stains.

Solid carbon dioxide is used for very small hemangiomas, residual patches of hemangioma, telangiectasis around the periphery of a lesion previously treated by irradiation, hemangiomas around the eyelids, and hemangiomas of the scrotum.

Good results can usually be obtained in superficial hemangiomas, but only when the surgeon understands the indications, contraindications, and limitations of all forms of treatment, including radium and roentgen therapy, the principles of good plastic surgery, and electrosurgery. It is certain that a working knowledge of only one type of therapy will not give good results in all types of superficial hemangiomas. SAMUEL H. KLEIN, M.D.

Seed, L., Slaughter, D. P., and Limarzi, L. R.: The Effect of Colchicina on Human Carcinoma. *Surgery*, 1940, 7: 696.

Investigations of the effect of colchicina as a mitotic poison began with the observation of Amoroso, who noted that in patients who had gout and carcinoma and were treated with colchicina and irradiation simultaneously the tumors regressed more rapidly than usual. After this observation, Ludford found that colchicina added to tissue cultures in dilutions of from 1:500,000 to 1:100,000,000 caused an increase in the number of mitotic figures, which resulted primarily from the accumulation of arrested mitosis rather than from the stimulation of mitosis.

If colchicina stops the division of cells in metaphase, such an effect would appear to be useful in the treatment of malignancies by irradiation. If irradiation is more destructive to dividing cells, and if the division of cells could be even temporarily stopped by colchicina poisoning, the effect of the radiation might be increased. The more rapidly growing cells are more susceptible to colchicina poisoning. On this basis the authors decided to try the combined effect of irradiation and colchicina on human carcinoma.

Colchicina was given in toxic doses to 4 patients with advanced carcinoma. Two of these died of colchicina poisoning, which was accompanied by fever and by severe agranulocytic leucopenia, anemia, and

a tendency to bleed, evidence of suppression of all the blood-forming elements. In the other 2 patients there was histological evidence of degeneration in the tumors within a few days and gross evidence of sloughing and absorption within a few weeks. In both patients the tumors, after the primary regression, began to grow at an accelerated rate. JOSEPH K. NARAT, M.D.

Hintze, A.: Results of Cancer Irradiation for Twenty-Five Years; 1,180 Five-Year Cures, 1,004 Free of Symptoms (Bestrahlungserfolge beim Krebs aus 25 Jahren. 1180 Fuenfjaehrige. 1004 Symptomfreie). *Strahlentherapie*, 1939, 66: 189.

There were two phases to this study: (1) experimental irradiation and irradiation for inoperable conditions; and (2) irradiation therapy by choice, for primary conditions or for recurrences. In this phase of our work it was soon found that cutaneous and mucosal cancer, accessible from the surface, could be brought to cure. The author's own material comprised 5,088 patients treated at the Bier clinic during the period from 1912 to 1933. Of these, 1,891 were treated exclusively by operation and 3,197 by irradiation, or by irradiation and operation combined. Most cases were given treatment with roentgen-rays; only a small number were treated with radium or with a combination of the two.

The material may be classified into 596 skin cancers, 919 cancers of the mammary gland, 973 cancers of the mucosa, and 709 cases of sarcoma. One thousand and four of the patients are free of symptoms after five or more years. Roentgen treatment has developed progressively; of the 5,088 patients treated, 3,579 were operated upon and only 604 were irradiated prophylactically after operation. In 1,509 cases irradiation was primary and this in a number of instances was followed by operation. Of the 2,975 patients operated upon primarily and not irradiated prophylactically, 1,084 were later given irradiation for recurrence. Therefore, of the 5,088 cases under treatment only 1,891, i.e. about a third, were treated exclusively by operation. Of the 5,088 patients, 1,737, or 36 per cent, are still living after five years. Of these, however, only 557 were treated exclusively by operation, while 1,180 were cured by exclusive irradiation, or by irradiation combined with operation. Therefore, it can be seen that the five-year results and permanent cures were usually obtained in cases in which exclusive irradiation or irradiation combined with operation was employed.

Of the 3,197 irradiated patients, 1,180, or 37 per cent were living after five years, and 736, or 23 per cent, were free of symptoms after five (to twenty-five) years. The patients with cutaneous-cancer cases presented the most favorable results, with 65 per cent living and 48 per cent symptom-free; the next most favorable results were presented by patients with cancer of the breast, with 36 per cent living and 20 per cent symptom-free, and last were those with sarcoma, with 38 per cent living and 26 per cent free of symptoms. These figures for cure are especially noteworthy in that they include all the inoperable patients. Only the patients with mucosal cancers presented poor results, with 19 per cent living, and 9 per cent free of symptoms. When those who died of intercurrent affections but who were free of symptoms for from one to five years, and those who were treated in the period from 1934 to 1937 and are living and free of symptoms, or who are dead of intercurrent disease, after a period of observation of from one to five years, are included, a total of 1,004 irradiated patients who are free of symptoms (of course not all with the observation period of five years) is obtained.

A table is appended showing the four groups, from which it is seen that the greatest part of the 1,180 cases include the group of exclusively irradiated cases (445); next is the group of recurrent-irradiated cases (368); in third place the operated and subsequently prophylactically irradiated cases (286), and last the irradiated and then subsequently operated cases (81). In the individual groups it is seen that in the cutaneous cancers, the sarcomas, and the mucosal cancers the best results are obtained by exclusive irradiation, and in the breast cancers, by primary operation with subsequent prophylactic irradiation. It is further observed, that in each of the four groups the cases irradiated for recurrence occupy second place. From this it is ascertained that irradiation of the patient with recurrence adds to the length of life; however, freedom from symptoms may be no longer attainable. Since recurrence is the rule even after the best of operations in cases of cancer of the skin, all patients who are operated upon must be prophylactically irradiated. However, in these cases exclusive irradiation without operation is fully justified also.

The author states that while Koenig reported to the Surgical Congress 3,000 exclusively operative cases from 30 German clinics, which had been free from symptoms for five years, he offers, from 11 radiological institutes and 8 irradiating gynecological institutes, approximately 4,000 cases free from symptoms for five or more years; these had been irradiated exclusively, or had been given combined treatment. He then goes on to state that at the clinic for women in Tuebingen, for example, the transition has been made from operative treatment to treatment by irradiation exclusively.

The results within the individual groups are portrayed in five tables, which may be consulted in the original article. (FRANZ). JOHN W. BRENNAN, M.D.

Fildes, P.: A Rational Approach to Research in Chemotherapy. *Lancet*, 1940, 238: 955.

An essential metabolite is a substance or chemical group which takes an essential part in a chain of syntheses necessary for bacterial growth. A "growth factor" which must be supplied in the nutrients is an essential metabolite which the cell cannot synthesize. Nicotinic acid is an essential metabolite for all bacteria, but a growth factor for only a few.

Anti-bacterial substances function by "interfering" with an essential metabolite and thus inhibit growth. The interference may be:

1. By oxidation of a substance which requires reduction.

2. By molecular combination, forming an inactive product.

3. By competition for an enzyme associated with the essential metabolite.

It is claimed that sulfanilamide acts as in "3," the essential metabolite being p-aminobenzoic acid. Class 3 inhibitions require an inhibitor so closely related in formula to the essential metabolite that it can fit the same enzyme, and sufficiently unrelated to be devoid of essential metabolic activity.

It is suggested that research in chemotherapy might reasonably be directed to making such modifications of known essential metabolites that they will have these characteristics.

SAMUEL KAHN, M.D.

McClure, R. D., and Lam, C. R.: Experiences in Heparin Administration. *J. Am. M. Ass.*, 1940, 114: 2085.

The authors present their results with heparin administration in a series of 11 cases. They believe that their patients presented definite if not urgent indications for heparinization.

The dose consists of 10,000 units of heparin dissolved in 10 c.cm. of saline solution. (This unit is five times larger than the original Howell unit, which inhibits the clotting of 1 c.cm. of cat's blood.)

The details of treatment as followed by the authors are as follows:

It is convenient to give the heparin in 2 per cent solution, but if there is an indication to restrict fluids more concentrated solutions may be used. In 1 case there was no ill effect from repeated injections of the undiluted solution. When the continuous intravenous drip method is used, the vein selected may be in the leg or arm. It is more convenient for the patient if the needle be in the leg, as this leaves both arms free for eating, reading, and personal care. In most instances a medium sized intravenous needle is inserted into the vein and taped firmly in place, without the necessity of "cutting down." The leg is not splinted; on the contrary, after a day or two the patient is encouraged to move all the extremities at will. In an uncoöperative patient, such as the man with tabetic dementia paralytica in our series, it is essential to fasten a cannula in the vein by ligature. When the patient has recovered sufficiently from his operation or infarction to be ambulatory, the needle may be transferred to a vein in the forearm, after which he may sit in a chair or walk about the room with the intravenous injection running. How long the patient should be ambulatory before the heparin is discontinued is not known; two days should be a reasonable period.

The 11 cases treated with heparin by the continuous intravenous drip method are summarized in Table I.

The potency of heparin obtained from different laboratories may vary markedly. This fact, together with the fact that there is no official standard of potency, causes confusion when results are compared. The unit referred to in this paper is that of the Toronto workers, namely the activity of 0.01 mgm. of the crystalline substance. Best believes that the potency of this product is perfectly constant. There is, however, considerable variation in the amounts required for different patients.

In general, the potency *in vivo* has not been as great as the authors had expected after reading the

TABLE I.—SUMMARY OF 11 CASES TREATED WITH HEPARIN BY THE CONTINUOUS INTRAVENOUS DRIP METHOD

No.	Patient	Age	Sex	Weight	Operation or diagnosis	Indication for heparin	Evidence of pulmonary embolism				Days of heparin	Approximate units per hour necessary	Total number 10 c.cm. vials	Chills
							Typical history	Physical signs	Hemoptysis	X-ray evidence				
1	W. P.	25	♂	191	Hernia	Embolism	+	+	+	+	6	2,000	20	3
2	B. S.	49	♀	157	Hernia, phlebitis	Embolism	+	+	+	+	15	1,000	40	4
3	N. V.	24	♂	154	Fractures	Embolism	+	+	+	?	10	2,000	40	2
4	S. K.	37	♂	180	Perforated appendix	Embolism	+	+	+	+	9	2,000	40	1
5	E. S.	45	♀	161	Ovarian cyst	Embolism	+	+	0	0	5	1,000	11	1
6	M. S.	52	♂	152	Hernia	Embolism	+	+	0	?	6	1,500	20	1
7	G. L.	62	♂	117	Popliteal embolus	Embolectomy	−	−	−	−	5	2,000	26	0
8	A. R.	45	♂	174	Hernia	Embolism	+	?	0	+	9	1,000	17	0
9	F. M.	42	♂	210	Peritonitis	Phlebitis	−	−	−	−	6	2,000	18	0
10	J. M.	35	♂	152	Tabetic dementia paralytica	Thrombosis of artery	−	−	−	−	2	2,000	11	0
11	W. K.	69	♂	187	Prostatectomy	Embolism	+	+	0	+	8	2,000	38	0

previous reports. As indicated in the table, 7 patients required approximately 2,000 units an hour to keep the clotting time above fifteen minutes, 1 required 1,500 units, and 3 required 1,000 units. The 2 females in the series were in the last group. The weight of the patients was not significant. Chills and fever, the only toxic effect observed, occurred in the earlier cases, but no such effects were noted in the last 5 consecutive cases. The price of heparin has come down appreciably since the authors began using it. The daily cost may not exceed $10 or $15, which is no more than the amount paid for special nursing care.

SAMUEL H. KLEIN, M.D.

DUCTLESS GLANDS

Desaux, A.: The Problem of an Internal Secretion of the Skin (Le problème de la sécrétion interne cutanée). *Presse méd.*, Par., 1940, 48: 411.

Desaux states that clinical and experimental findings show that excitation of a considerable area of skin produces a normal physiological cutaneous reaction without structural change, which is characterized by the liberation of certain chemical substances in epidermic and dermic tissues that are discharged into the circulation and thus affect distant organs. These substances are not true cutaneous hormones, as they are not specific for the skin but are also produced in other tissues. Certain types of radiation liberate estrogenic substances from the cutaneous tissues which are also discharged into the circulation.

A number of investigators have carried out experiments with cutaneous extracts of the skin. Japanese investigators, who consider that the tip of the rabbit's ear is a typical skin tissue, have obtained a substance that they call "esophylaxine" from this tissue by perfusion. Very similar effects have been obtained by stimulation of large areas of the skin and by the injections of an aqueous cutaneous extract or of esophylaxine. By either of these methods, infections of various types are inhibited; the basal metabolism is increased (by stimulation of the thyroid); the sympathetic system is stimulated; and the blood sugar is reduced.

The author has prepared a lipoid extract of the skin (pig skin). In one experiment on rats, in which large doses of this extract were given, no definite effect on the endocrines was noted; hemorrhagic lesions in the liver and kidneys resulted, and there were marked changes in the epidermis with increase in cellular mitosis and lesions of parakeratosis. In another series of experiments on rats in which small doses of this extract were used, the animals showed a gain in weight and vitality, increase in the size of the thymus, and a diminution in the magnesium and especially in the calcium content of the skin. The diminution of calcium in the skin indicates the development of increased excitability, which probably explains the cutaneous lesions produced by the larger doses.

ALICE M. MEYERS.